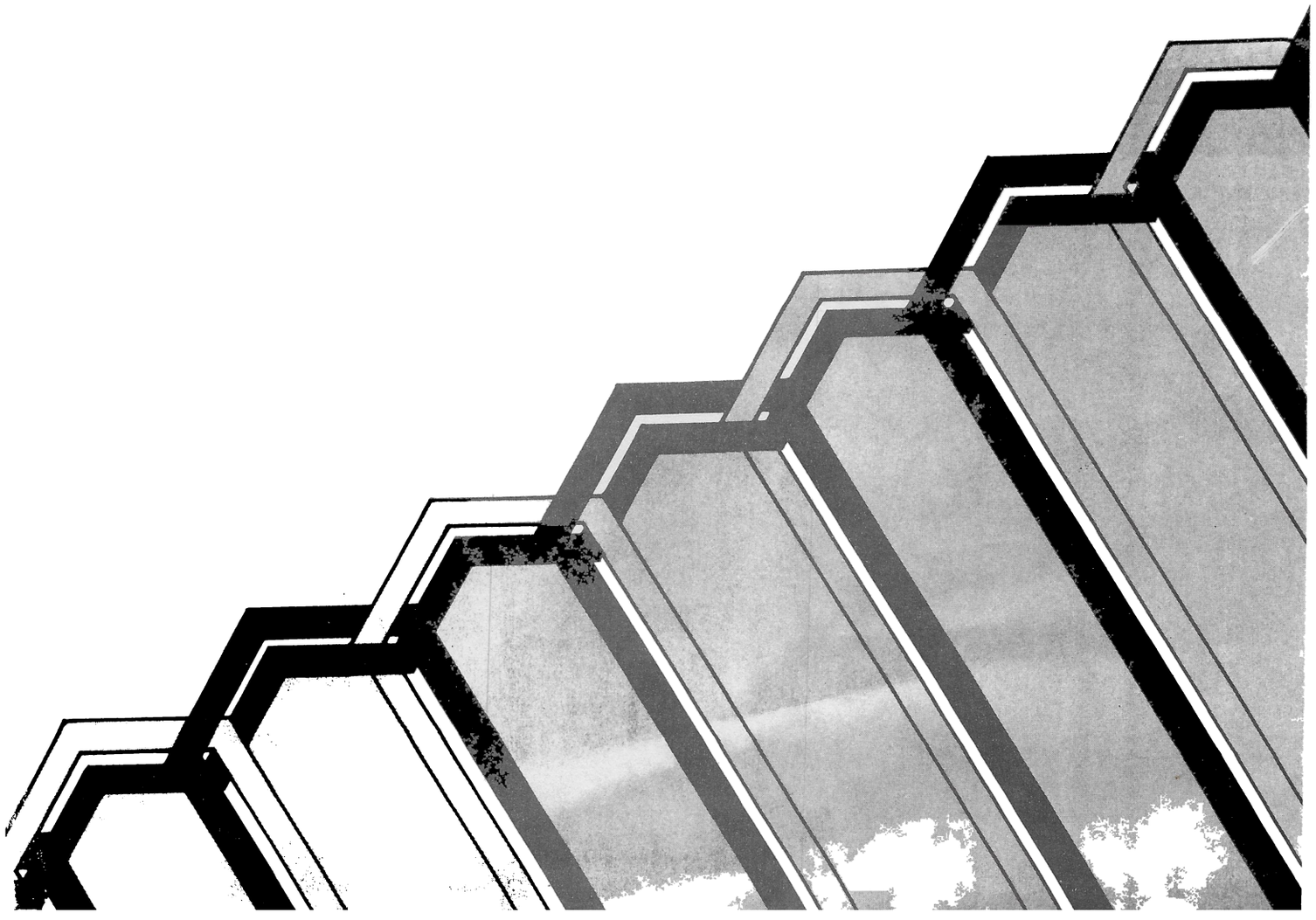
AVL LOOMS

AHRENS & VIOLETTE LOOMS, INC.

BUILDERS OF FINE HANDLOOMS
& PRODUCTION WEAVING EQUIPMENT

Weaving Instructions



INTRODUCTION

In many ways the Ahrens & Violette looms are an innovation in the weaving field. Jim Ahrens, a mechanical engineer with over forty years of professional weaving experience, designed the looms. His search for a hand loom that would function more efficiently than the present looms available led him into years of research into old and, in many cases, nearly forgotten loom designs and weaving techniques. He studied all the ancient looms and especially the looms of the guild masters of Europe. Much of this information he found in old and out-of-print books. He also has operated, and has an intimate knowledge of power looms. He refined what he considered to be the best and most workable features of all these looms - the features most suited to reducing time and effort from the weaving procedure and maximizing professional results. He created the Ahrens & Violette looms with their many unique features.

Learning to warp and weave on an AVL Loom will mean learning some new procedures and techniques even for the experienced weaver. Since the looms will not function to their full capacity unless care is taken to dress and operate them properly it is greatly worth your while to study the following instructions in detail. The time taken to really make these procedures your own will result in increasing your weaving speed and efficiency, and this leads to a greater enjoyment of the entire weaving experience.

The information presented in the following pages represents what I have learned directly from Jim Ahrens coupled with my own experience of having worked on the looms over many years.

Sincerely,

Robin Violette

16 HARNESS DOBBY LOOM

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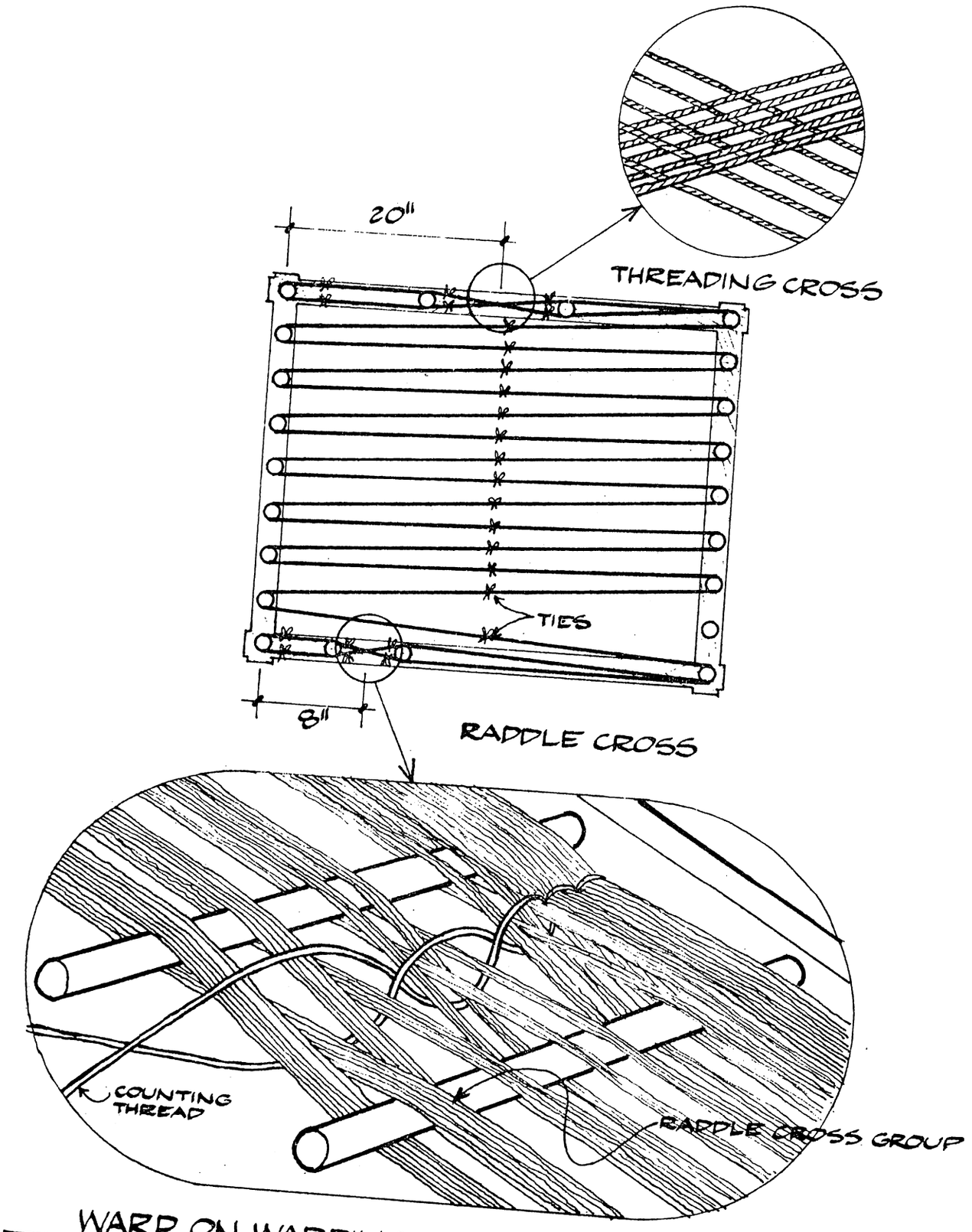
WINDING ON THE WARP

Various warping methods can be adapted to the AVL looms. However, we recommend the following method in which the warp is wound on from the back of the loom with use of a raddle. Please study this method and try it. We have found that it aids in getting a uniform warp tension, especially when dealing with long warps of 20 yards or more.

1. To begin, first wind the warp on a warping board or reel (refer to diagram on next page). Make sure you put in two crosses, the threading cross, about 20" in from the first peg, and a raddle cross, about 8" in from the last peg. In the threading cross, each thread crosses the next thread in opposite directions. In the raddle cross, groups of threads cross each other. The number of threads in a raddle cross group is determined by the number of ends to be placed in each section of the raddle. Since this will vary with each warp, take a minute before starting to wind your warp on to your warping board or reel to figure out how many threads will be in each raddle cross group. To determine this you must first know the number of ends per inch in your planned weaving and the number of divisions per inch in your raddle. Sometimes this will be merely a matter of division as with 12 EPI and a 4 dent raddle; there will be three threads in each raddle cross group. Other times you may have to fool with it more and have different number of threads in each raddle cross group, as with 15 EPI and a 4 dent raddle, us the sequence 3,4,4,4, in the raddle cross groups.

   A still more satisfactory possibility is to plan on threading the raddle a few inches wider than the warp will be sleyed. For 15 EPI and a 4 dent raddle, use three threads in each raddle cross group. This will mean your warp will be threaded through the raddle at 12 EPI even though it will be sleyed through the reed at 15 EPI. As long as the warp is no more than 2 or 3 inches wider on either side of the



WARP ON WARPING BOARD WITH TWO CROSSES

raddle than it is through the reed, this actually creates an ideal angle for the selvage threads traveling across the loom as they won't be bent by the draw-in at the web of the fabric. Never plan on threading the raddle thinner than the warp will be sleyed or the selvage threads will be very bent and poor tension will result.

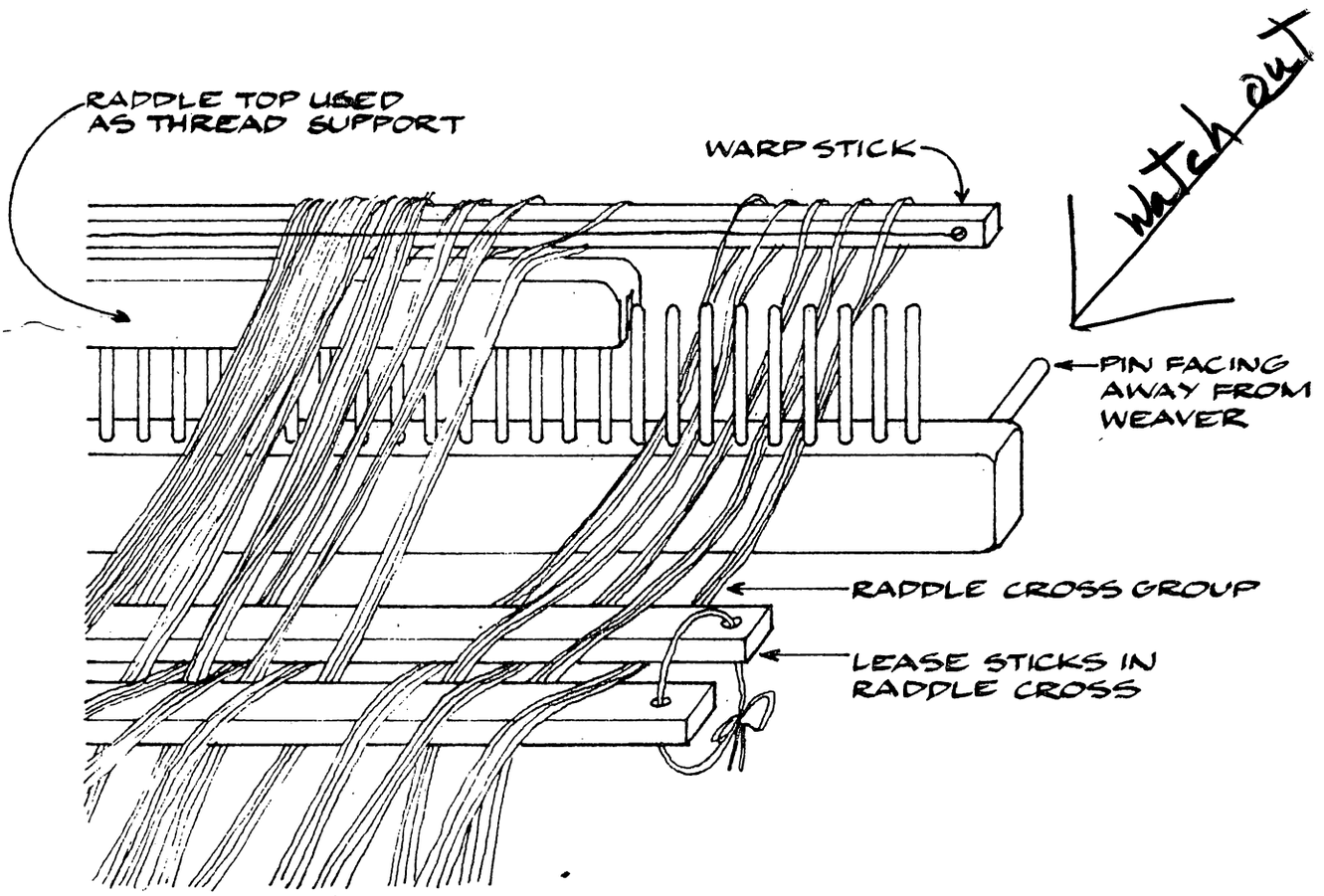
2. As you are winding your warp onto the warping board or reel, it is a good idea to use a counting thread at the raddle cross to keep count of your warp threads. If you are using 4 threads in each raddle cross group, you know you will have 16 threads when four raddle groups intersect. As the winding process proceeds keep the raddle cross groups somewhat spaced apart and forward on the pegs so that you can see them easily, until 4 raddle cross groups are complete. Then twine the counting thread once around all 4 groups making a bundle and push it together and back on the pegs. Continuing in this manner it should be easy to count the number of bundles, (in our example, we have 16 threads in each bundle). Divide the number of threads in each bundle into the total warp ends needed to find out how many bundles will be needed. When you are sure you have the correct number of warp threads, remove the counting thread.

3. Now secure both crosses and make TIGHT choke ties. Do NOT cut the end loops; instead secure them firmly with two or three ties so that the loops can not fall apart. This will save you time later. Then remove the warp from the warping board by chaining (or better still using a drum or other device for keeping the warp taut) from the treading cross to the raddle cross.

4. Place two thin 3/16" lease sticks in the raddle cross and secure together with string through the holes in the ends of the sticks. Then place one of the fatter 7/16" warp sticks in the end of the loop of the warp closest to the raddle cross. If you secured the loop properly this only takes a second, otherwise you have a mess. Take a long piece of string and run it across the warp stick, through the

holes in both ends, around the other side and tie it together, forming a security cord so the loops can not slide off. Now remove the original ties from the ends loop and raddle cross and spread the warp out on the sticks.

5. Working at a table, distribute yarns through the raddle by dropping each raddle cross group into a dent in the raddle as in the diagram. Make sure the warp is centered and secure. If you are using a sliding raddle cover, secure it with 2 or three cord ties so it can't come off. Now remove the raddle cross sticks when this is completed.



THREADING THE RADDLE

6. Before winding on the warp, there are a few small things to take care of on the loom. First, check the tension devise to make sure the rope is wrapped three times around the tension drum and that the rope end is clipped to the spring (see diagram page 12). This will prevent the warp beam from slipping backwards during winding and threading. Also make sure the stop pin is in its place in the rear cloth take-up drum so it won't unroll. Check the cloth take-up weight. Turn the cloth take-up handle until the weight is in its top most position.

7. Now secure the raddle to the back of the loom. If you have an AVL raddle, simply slip it into the set of holes in the back of the rear vertical members (see diagram page 8). If you are using some other raddle you will need two 1/4" pieces of doweling six inches long. Insert these into the same holes and then tie your raddle to these. When winding on, the warp threads should go through the middle of the raddle. If they rub or push on the top or bottom of the raddle, move the raddle to a different position.

8. Next, the warp stick, with end loops centered and distributed evenly, is brought over the top of the warp beam roller and then is attached to the warp beam. Here there are two alternative methods which you can use: The warp stick can be placed directly into the groove in the warp beam, or an apron can be wound around the beam and the warp stick lashed to the apron bar.

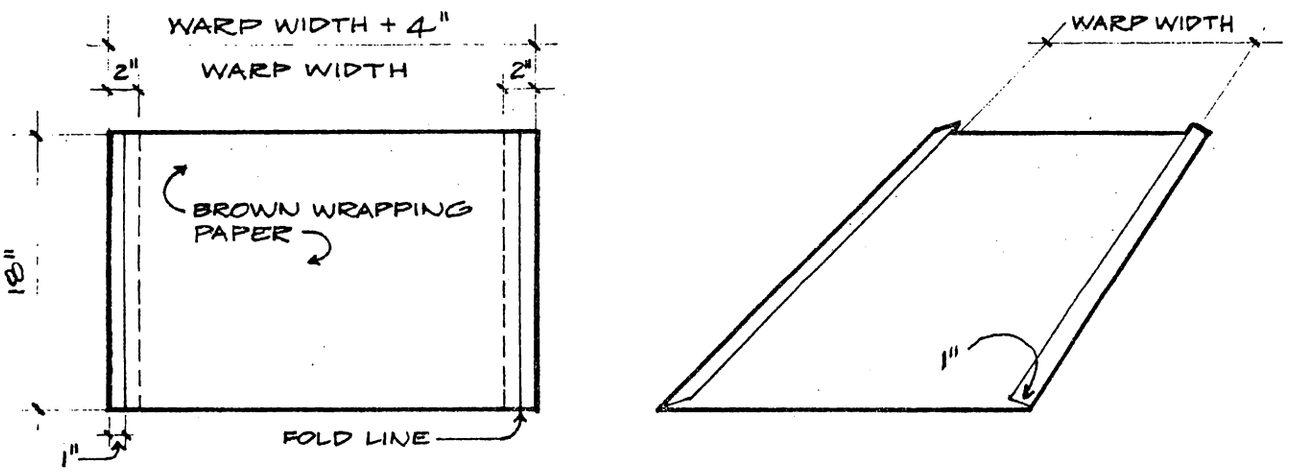
   Jim Ahrens recommends that the warp stick be placed directly in the groove in the warp beam. The idea behind this being that the warp can be wound on very tightly and smoothly without any lumps or bumps, thus giving a perfect tension in the weaving and creating professional results, especially with longer and finer warps. However, in order to extend the end of the warp so that there is very little warp waste, the weaver must release tension when there is only a few feet left of the warp, remove the warp stick from the groove, wrap the apron around

the warp beam, and lash the warp stick to it. This is quick and easy to do and is explained in more detail later on. Try this method and see how you like it. If you are using heavy yarn and find that it is difficult to get the warp stick in the groove, it is okay to apply pressure or even a hammer if necessary. Use something like a screwdriver to pry the stick out of the groove.

As an alternative, the warp stick can be lashed right onto the apron before warp winding begins. This eliminates having to extend the warp toward the end of weaving, however, it also means you won't be able to wind your warp on as tightly since the layers of apron around the beam will be a softer surface for the warp threads. However, many weavers do not find this to cause any problems with tension in the weaving. So it is really a matter of what works best for you. If you do want to use an apron for winding on, you will have to order an extra one from us. Take your apron and make sure a metal rod is inserted into both ends. Place the hemmned edge of the apron with its metal rod into the groove in the warp beam and wind it around the beam (see diagram page 3) until the metal rod inside the hem with openings in it is only a few inches away from the beam. Take a strong cord and lash the wooden warp stick onto the metal rod as in the diagram.

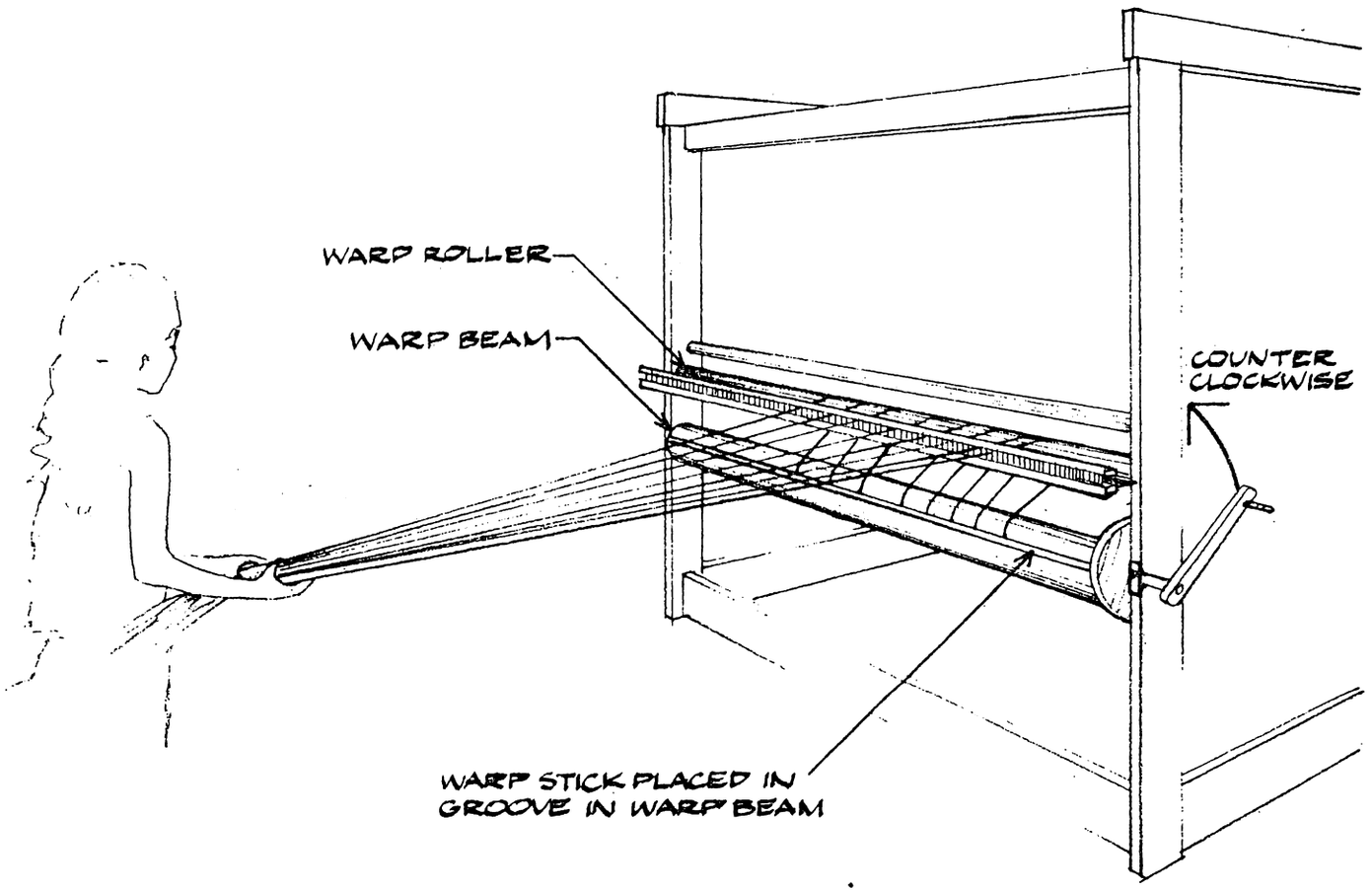
9. Next prepare paper for winding between warp layers. Again, for the most professional results, and few tension problems, we suggest that the warp be as smooth, tight, and compact as possible. This would mean not using corrugated paper or sticks as they will make the wound on warp too fat and/or lumpy. Corrugated paper is just too soft and the warp can never be wound tight enough with it. A heavy wrapping paper works well, 70 lb Kraft paper is good. It is not necessary to add to the bulk of the wound on warp by winding paper throughout, as a tightly wound warp eliminates any cutting of one layer of warp into another. Actually with a tightly wound warp the papers' only purpose is to support the edge yarns so they will not fall off themselves and create a poor selvedge tension. An 18" long length of paper wound in

about every 1 1/2 yards of the warp is sufficient for this. So cut lengths of paper 18" long and at least 3 or 4 inches wider than the warp width, and enough to have one about every yard and a half of the warp. If you are going to be using smooth slippery warp yarns like fine linens or perle cottons, the edge yarns are going to need extra help in order not to slip off themselves. To do this, cut your paper 4 inches wider than the warp width and then fold over the edges an inch on each side. Be sure the warp is wound between the two folded edges, but not overlapping them.



PREPARED PAPER WITH FOLDED EDGE

10. When winding the warp on from the back, that is with the warp spread out in back of the loom turn the crank in a counterclockwise direction so that the warp comes in from the bottom. See diagram.



WINDING ON THE WARP

I will say it again because it is so important - wind the warp on TIGHTLY under a lot of tension. This will vary with each warp material, but a good rule to remember is that the tension of the wound on warp must be greater than that put on it during the weaving operation. For a wide heavy warp several helpers can be required. If the choke ties are very tight, and enough tension is applied to the warp most of the combing should be unnecessary.

Watch the edge yarns, and wind in a layer of paper when they have built up to the point when they will no longer support themselves.

11. If your warp has wound on nice and even without a lot of combing, try this method for winding on the last two or three yards of warp: Put a square warp stick through the loop in the end and put in the two thin lease sticks in the threading cross. Tie all sticks so they can't fall out and put a heavier stick through the loop to pull on. Then remove all the ties and spread the warp out. Continue winding until the threading cross will just reach the rear of the harnesses. This technique is used especially with wide warps to eliminate the acute angle which is formed as the end of the warp comes close to the warp beam. With thin warps it is not necessary.

12. When the warping is completed, free the warp from the raddle. If you have an AVL raddle first untie the security strings, lift the raddle top off, and remove the warp from the raddle. Afterwards replace the top on the raddle and leave it in its place on the back of the loom if so desired, it will not interfere with the weaving process. Then be sure to bring the end of the warp around the warp beam roller so that it now travels into the loom. See diagram of Threading Position, page 10.

13. For those who ordered the second plain beam, it is wound in exactly the same manner as the first warp beam except that the warp goes under the second warp beam separation roller and up to the second

warp beam. Remove the crank from the first warp beam and place it on the second beam for winding. After the second plain beam is wound, you will need to change the position of the second warp so that it goes down from the second warp beam over the back and under the separation roller and then through the heddles.

THREADING, SLEYING, AND TYING ON

1. To prepare for threading, first tie the threading cross sticks up to the rear of the castle with lengths of string so that the cross is even with the eyes of the heddles. Now cut the warp ends so they will be ready for threading.

2. Next, lift out the beater and front cloth beam. To free the cloth beam, unscrew the upper left bolt in the cloth beam support (use a small wrench which you keep just for this purpose) and remove the top half of the block. Then unfasten the chains from the bottom of the lower harness sticks so that the heddles will move easily.

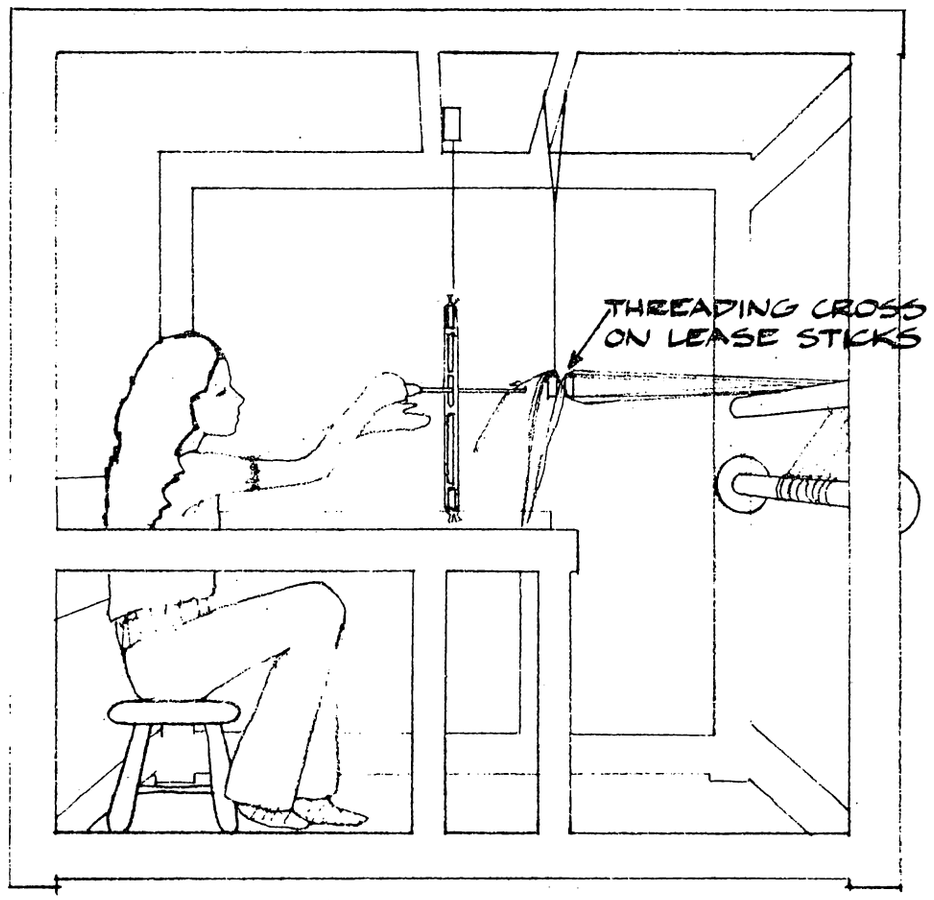


DIAGRAM OF THREADING POSITION

3. Remove the Lower bolt on the side of the built-in bench and tilt it to a vertical position so you can use it as a back rest, then place a small stool on the floor in front of the bench to be sat on for threading; or what really works well is a board placed across the lower side pieces with a pillow in the middle. The threading seat should be just the right height so that the heddle eyes are at just your eye level or a little higher. They should never be lower, or you will have a difficult time threading. For taller people, it may be necessary to raise the harnesses. To accomplish this, first make sure nothing is pegged up on the dobby unit. Then pull the dobby arm down to the bottom of its slot without raising any harnesses. Secure the arm in this downward position with heavy cord. On the bottom of the dobby unit are 16 cable ends corresponding to the 16 harnesses. In turn pull each cable end downward while reaching into the dobby box and placing the copper stops on each cord into its slot in the arm, thus raising the harnesses. Make sure to lower the harnesses again when threading is completed. The important thing in threading is your comfort. Take the time to position everything so your body feels at ease while threading.

4. If you prefer, you can use the "shortcut" threading position which is simply to thread sitting up on the bench, beater and cloth beam in place. This saves you the time of taking the loom apart, but it is not quite as comfortable. However, it is not too bad if your threading time is not going to be too long. Place a cloth over the cloth beam so the sandpaper won't scratch you, and position the cross sticks below the heddle eyes so you can easily see the cross from your sitting position. Another time saver--remove the chain links from only one side of the bottom harness sticks and see if the heddles won't move well enough.

5. Initially you may find that the polyester heddles take you longer to thread than metal heddles because they don't move on the harnesses quite so easily. However, we feel that a multi-harness loom capable

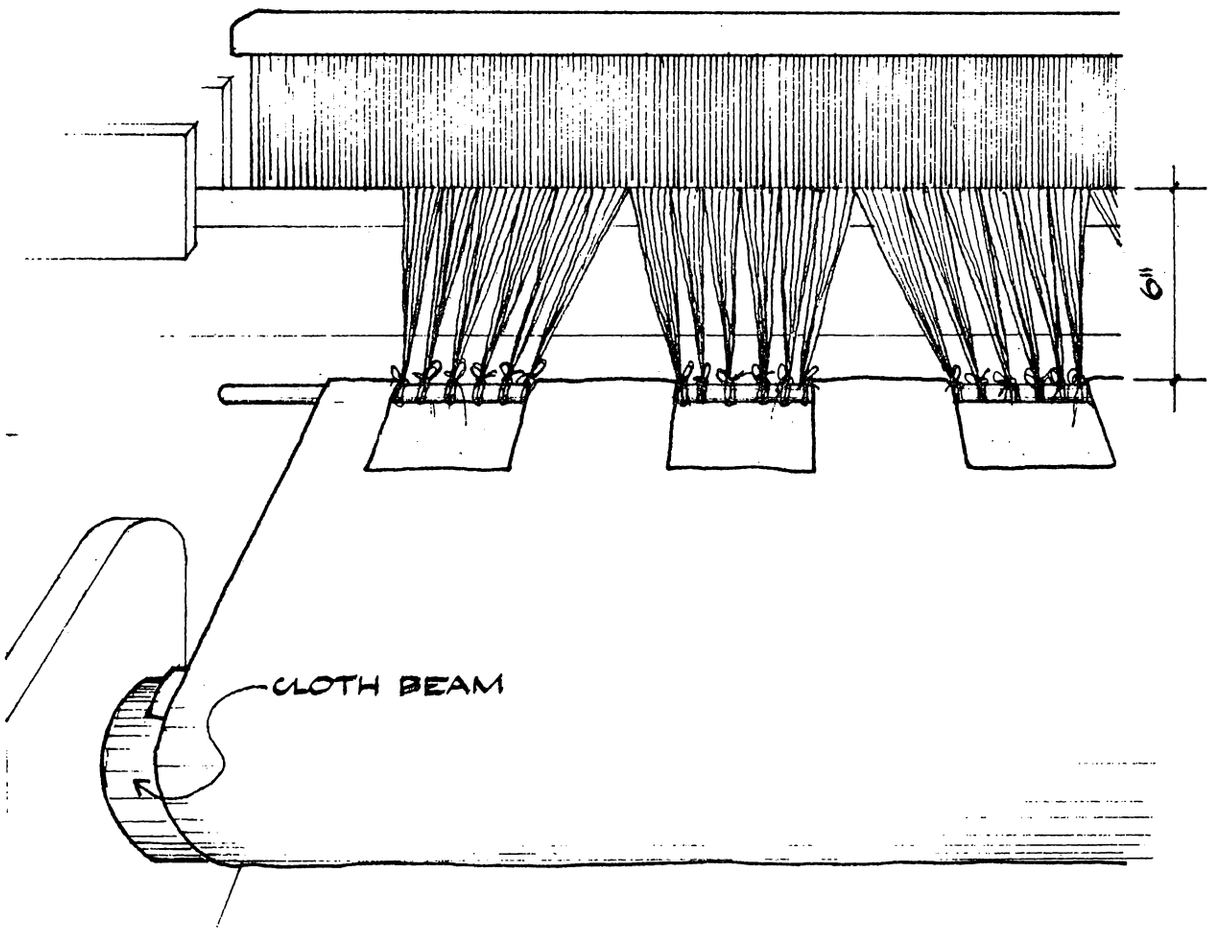
of production use should have a light harness action, and thus we purposely chose the polyester heddles because of their extreme light weight.

6. After the heddles are threaded, remove the stool and tilt the built-in bench back to a comfortable sitting position, fastening it in place by tightening the nut. Then replace the beater and sley the warp ends through it while sitting up on the bench. Weavers have various ways of positioning the reed for sleying. Here's one that you might try: Secure the beater in a middle position using binding cords. Then remove the top of the beater and slant the reed forward. After sleying is completed attach the chains to the bottom eyelets of the harnesses and replace the front warp beam making sure the ratchet and ratchet handle are in the correct position.

7. Now take up the cloth apron that comes with the loom. We call this a temporary apron because it is not attached to the loom and it will be removed early on in the weaving process. (Due to shrinkage problems, do not wash your apron.) Notice that it has twohemmed ends. One is a hem with openings in it and the opposite end a plain hem. Take one of the metal rods and slide it into the hem with openings. Place the opposite end of the apron flat along the cloth beam and wrap it around the cloth beam as in the diagram until the metal rod can be extended over the top of the beam to within 6" of the beater in its rearward position (see diagram next page).

8. The warp is now tied on to the metal rod inside the openings. Tie the yarns on evenly and tautly, but you need not spend a long time fussing with them as once you have set the tension device and woven in two flat sticks (instructions for all this is coming up next) your warp threads will automatically have a completely even and perfect tension.

9. At this point make sure that the unused heddles are all pushed to the far sides of the harness sticks between the hooks and the ends of the



TYING ONTO APRON

harness sticks. For balance there should be near to equal numbered groups of unused heddles on both sides of each harness. In some cases, as when you have a very wide warp with a lot of unused heddles on the ends of the harnesses, you may need to tie each group of unused heddles into a tight bundle with tie-tapes or string, to keep them from falling off the ends of the harness sticks. Or you may need to take heddles off the loom. If you do this make sure to mark each bundle of heddles with its harness number, so it can be put back on the same harness. Once the heddles have been on the loom for awhile it is not a good idea to switch heddles to different harnesses as the heddles on each harness get stretched out to different sizes. Mixing them up once they have been stretched out would effect the evenness of the shed. What some weavers do with wide warps, in order to avoid having to take off extra heddles, is to distribute the unused heddles among the threaded heddles as the threading is taking place.

SETTING THE TENSION DEVICE

Warp tension on an AVL Loom is controlled automatically by a special weighted tension arm which insures a constant and even tension at all times. The tension is easily adjusted, and the warp beam is released automatically as the cloth is advanced.

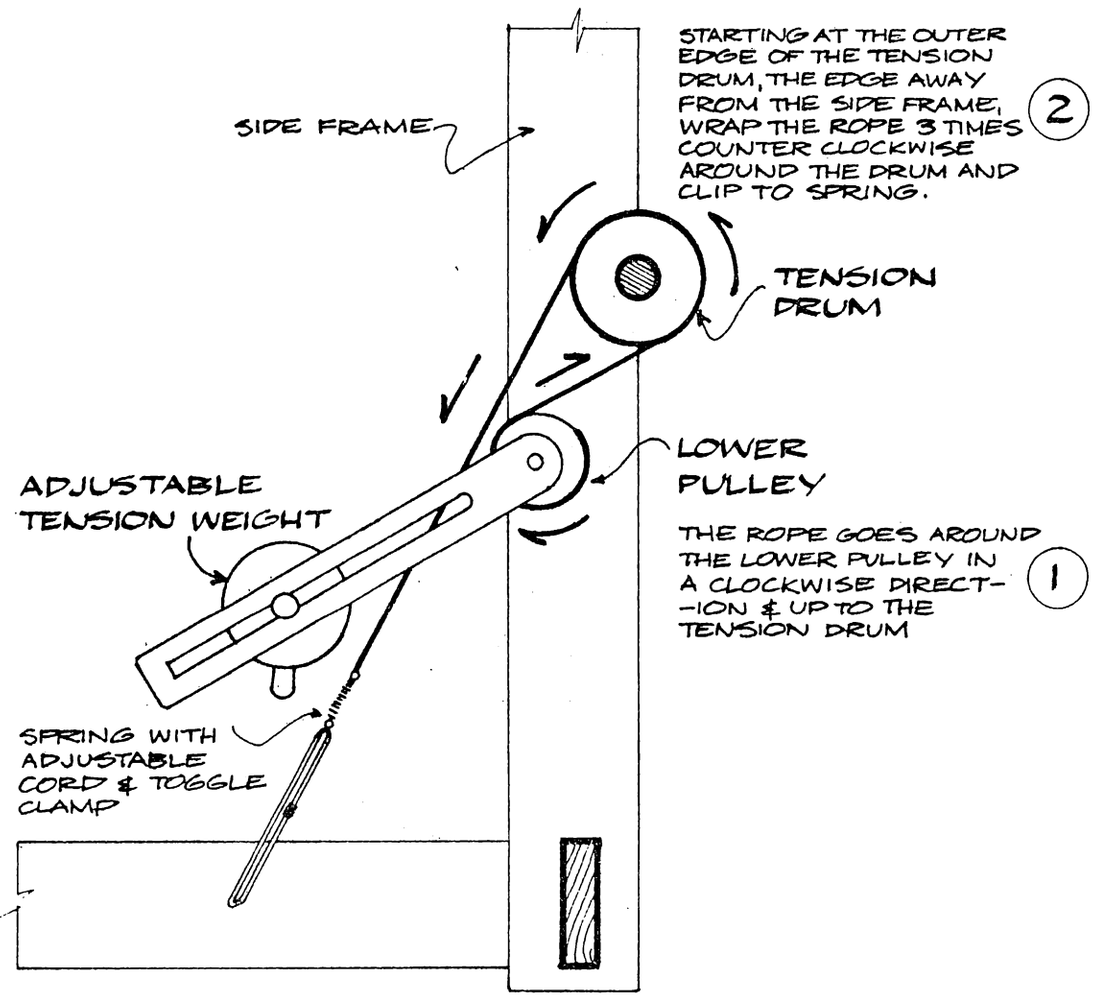
1. You should already have the rope wound round the tension drum and the rope end clipped to the spring. Do this before winding the warp on to prevent the warp beam from turning backwards while winding on and threading. Be sure to check with the diagram to make sure you are doing this right. The rope should make three turns around the drum and must start from the correct position. Always check again to make sure the rope has not gotten crossed over itself.

2. To set the warp tension, first move the weight to its rearmost position (next to the wooden pulley). Wind the warp forward slowly, using the ratchet handle on the cloth beam. Continue winding until the weighted lever rises and stops when the rope slips on the brake drum.

3. The lever should stop approximately in a horizontal position. If it rises above horizontal, let the adjusting cord out at the spring. If it stops below horizontal, shorten the cord. The length of the adjusting cord is changed by squeezing the ends of the small plastic toggle clamp together and then pulling the cord through it. On a new loom the brake rope may have to be shortened occasionally to bring the weighted arm up to the horizontal position until the rope is stretched out.

4. Now feel the warp for tension. If the warp is too loose, set the weight further out on the arm. Wind the warp forward a little and re-check. You will find that you can weave with less warp tension

with a weight control than with the conventional ratchet system. Once the correct tension adjustment is made, it will be maintained automatically as the weaving is advanced. For light fragile warps it may be necessary to use a lighter weight than the one that comes with the loom, and for dense heavy warps you may have to add some weight to the arm. A bag filled with sand works well for this.



TENSION DEVICE

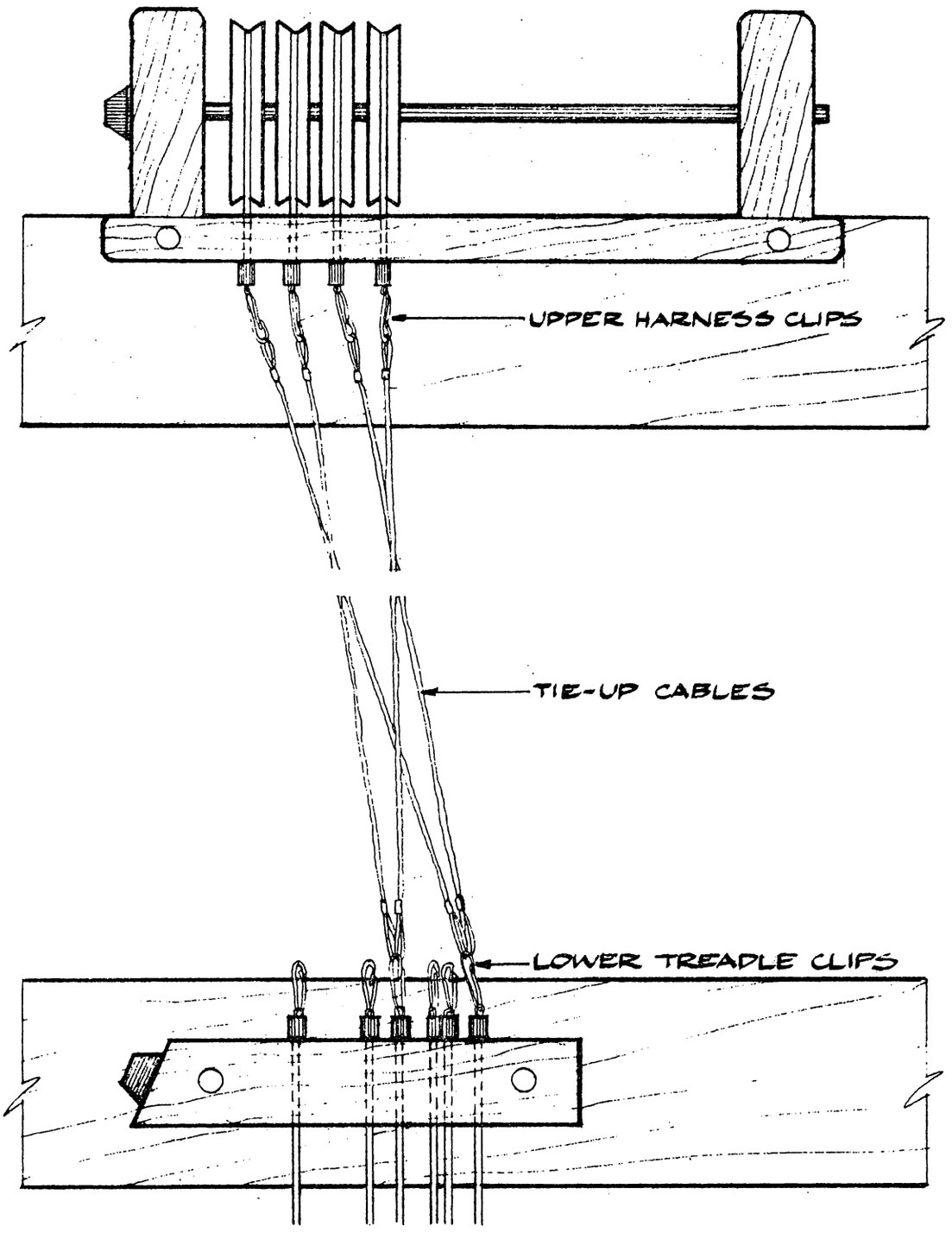
5. In making these adjustments, at times the warp will be wound too far forward. To wind it back on the warp beam first release the tension at the front of the loom and then go around to the back of the loom and lift the tension arm, then turn the crank so that the warp beam turns backwards. Always check to see that the tension rope has not become crossed over itself after this operation. Then wind the warp forward again with the front ratchet handle until the tension arm rises to horizontal.

USING THE MODULAR LOOM

With an AVL modular loom all treadle to harness tie-ups are done at the side of the loom by connecting pre-tied cables to metal clips. This eliminates the necessity of having to climb under the loom and having to make time-consuming cord adjustments as is necessary on conventional looms.

1. On the right side of the modular loom you will notice that there are two sets of clips; a lower set of treadle clips and an upper set of harness clips. See diagram next page. In the upper set of clips there is one clip corresponding to each harness. In the lower set there is one clip corresponding to each treadle. First tie up your loom for a tabby weave, as tabby weave will always be used for the first couple of inches of each new warp as a heading. It is easiest to make all treadle connections first and then all of the harness connections. For a tabby weave using four harnesses, first connect the two cables each to two adjacent treadle clips, then connect the two cables from one treadle clip to the clips for harnesses 1 and 3. Next, connect the two cables from the other treadle clip to the clips for harnesses 2 and 4 as shown in the diagram on the next page.

2. With more complex weaves using four treadles or more, I have found it helpful to use a "walking" technique for the treadling. Using this method the tie-up is made so that treadling begins at the two innermost treadles and you can "walk" to the outside treadles using alternate foot movements. With this method you never lift more than one foot at a time and thus are not thrown off balance, and it is easy to establish a weaving rhythm--so important for speed and uniformity in the cloth. You will have to rearrange conventional tie-up plans, which read from left to right, in order to do this.



MODULAR LOOM TIE-UP

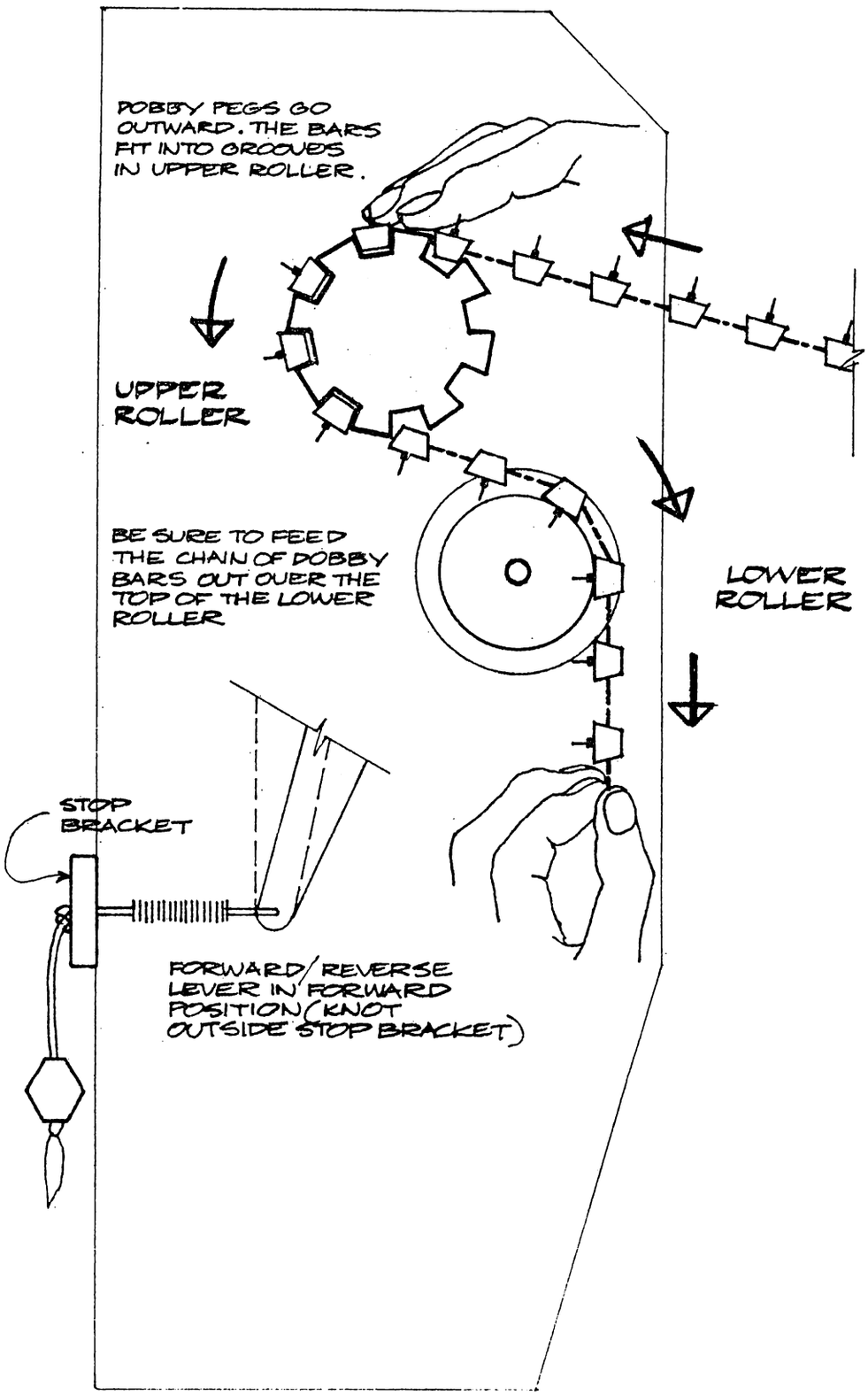
3. If your modular loom does not have the optional cloth storage roller, you will have to be aware of the amount of cloth build-up on the cloth beam and plan your projects so that they can be taken off the cloth beam in sections. (An easy method for doing this is described in Section 9. on page 36.) If the woven material builds up too high on the cloth beam, it will distort the shed geometry and affect the tension in the weaving. Since different materials will build up quicker than others, here are some guidelines to follow for the amount of yardage to have wound on the cloth beam: Up to 40 yards for a very fine fabric, up to 30 yards for a medium fine fabric, up to 20 yards for a medium heavy fabric, and up to 10 yards for a heavy fabric. You will get your own feel for this with a little experience.

PEGGING THE DOBBY UNIT

The dobby loom provides the means for quickly and easily raising any number of harnesses in any combination by the alternate use of only two treadles. This is accomplished by the use of a chain of wooden bars which are placed in the dobby mechanism, or "head," in which short metal pegs can be easily inserted. Each wooden bar has a row of 16 holes in it. The first hole on the left corresponds to the first harness, the second hole to the second harness, and so on. Now the way the dobby works is that each wooden dobby bar controls one shed, and when a peg is inserted into a hole in a bar it causes the corresponding harness to raise when that bar comes around into position by pressing on the treadles.

1. The first pattern you need to peg up on the dobby bars is a tabby weave. Tabby weave will always be used for the first inch of each new warp as a heading. Take one of the chains of 20 dobby bars and lay it flat on a table with the larger surfaces face up. In the first bar (start at the top of the chain and work downward) place pegs in holes 1,3,5,7,9,11,13, and 15 using the special wrench provided. First place the smooth end of the peg in the wrench. Then holding the wrench handle, screw the peg into its hole firmly, but not too tightly. (Use the wrench again when removing pegs). In the second bar place pegs in holes 2,4,6,8,10,12,14, and 16. Continue repeating these two sequences until all the bars are pegged.

2. Now place the pegged up chain in the dobby unit. Note that in the dobby unit are two rollers - a large grooved upper roller and a smaller lower roller with a metal rod. Next find the forward-reverse cord. It is on the side of the box facing the front of the loom (the side with all the gears). There is a wooden pull hanging from the end of a cord. Pull this gently until the knot on the rope is caught on the outside of the wooden stop bracket. The large grooved roller will



FEEDING DOBBY CHAIN INTO DOBBY HEAD

now turn in a counterclockwise (assuming you are at the front of the loom) direction. Take your tabby chain and place the top few bars in the grooves in the top roller of the dobby box. Turn the roller toward the top of the loom so that the chain moves over the top of the roller and into the dobby box. Place your fingers in the box under the top roller and guide the chain so that it comes out over the top of the smaller roller which is underneath. This is very important because the dobby chain will jam in the box if it does not come out over the top of the smaller roller. When enough chain is available fasten the chain together to form a continuous circle using tie tapes, jewelry hooks, or string. If using string make sure it is strong and wind it around two times making a tight square know after each turn.

3. Next you will probably want to peg up another chain with a more complex weave structure (a 16 harness point twill is an easy one to try first). The first step is to draw up a "peg plan" which is a graph that shows the order in which the pegs are inserted into the dobby bars. The peg plan takes the place of the tie-up and treadling plans used with conventional treadle type looms. Use the following procedure for determining your peg plan:

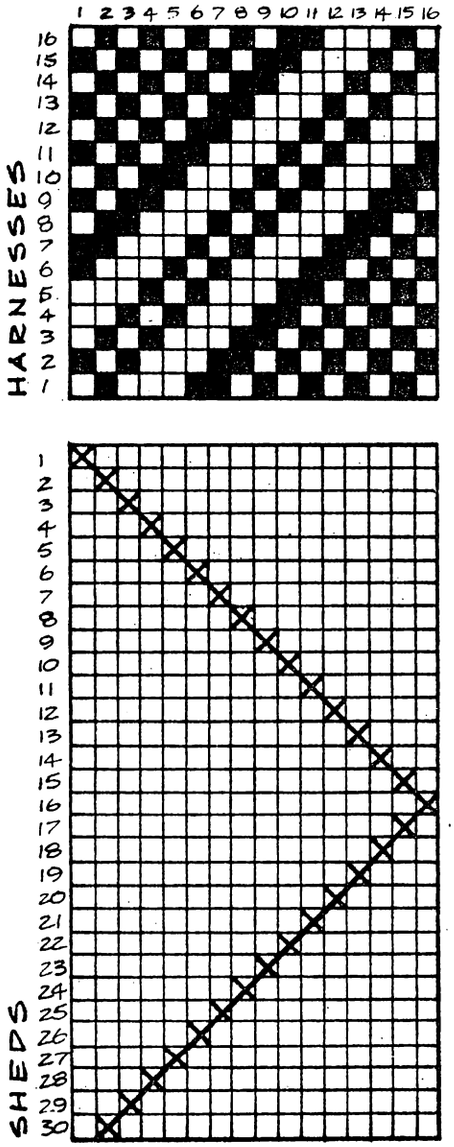
    a. First determine the tie-up and treadling plan for the weave structure you will by using as you would for a conventional treadle loom. Diagram (a) on page 26 is an example showing a typical pattern with its tie-up on top, and its treadling plan below; the threading plan (a 16 harness point threading) is not shown. In the tie-up each vertical column represents one treadle (numbered 1-16 from left to right), and each horizontal row represents a harness (numbered 1-16 from bottom to top). Squares are filled in showing which harnesses are to be tied to each treadle. Please note that the filled in squares represent <u>raised</u> harnesses.

In the treadling plan below each horizontal row represents one shed and they are numbered from top to bottom in the order they will be used when weaving. At each shed an X is placed in a vertical column representing the treadle which is to be used. Make sure your treadling plan represents one complete repeat of all the sheds needed to weave your pattern.

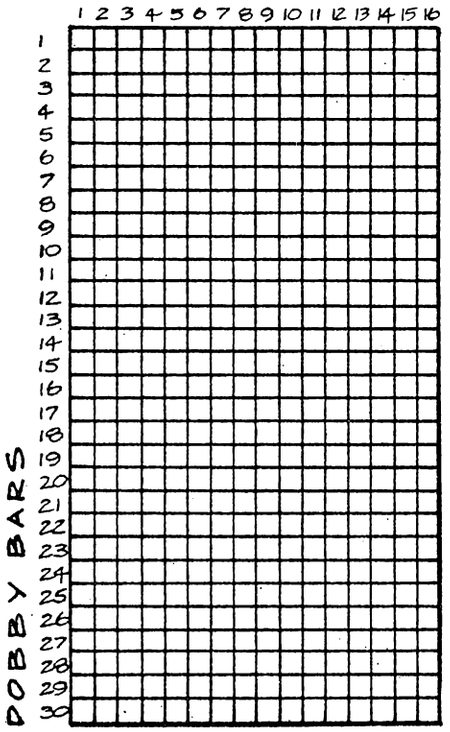
b. Now on graph paper you will construct a peg plan. In your peg plan each horizontal row will represent one dobby bar and they will be ordered from top to bottom to correspond to the way the dobby chain feeds into the dobby head; and each vertical column represents the holes in the dobby bars and their corresponding harnesses. If you are using all 16 harnesses on the loom there will be 16 vertical columns numbered from left to right. The number of horizontal rows (or dobby bars) needed will be the same as the number of sheds in the treadling plan. Refer to sample peg plan (b) and notice that there are 30 horizontal rows since there are 30 sheds in treadling plan (a).

c. Now you are ready to start filling in squares in your peg plan. First look at the first shed (1) in your treadling plan. Then look above to its corresponding vertical column in the tie-up and note which harnesses are to be raised. In diagram (a) that would be harnesses 2,6,7,9,11,13, and 15. Now fill in the squares that correspond to the harnesses in the first horizontal row of your peg plan as we have done in diagram (c). This represents in which holes pegs will be placed in the first dobby bar, and thus which harnesses will be raised by it. Notice how <u>horizontal</u> rows of the peg plan correspond to <u>vertical</u> columns of the tie-up.

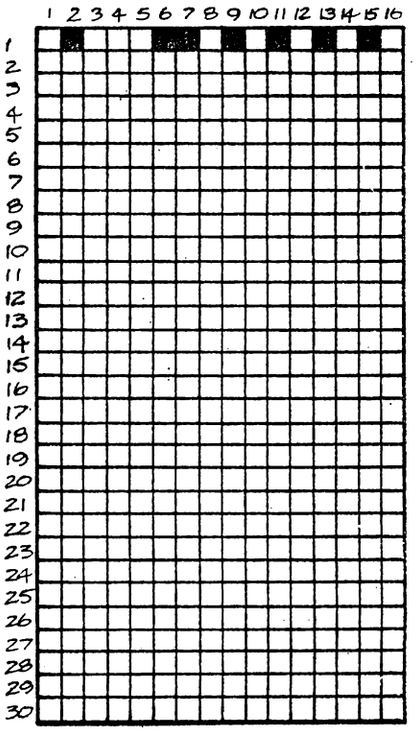
a. TIE-UP & TREADLING PLAN



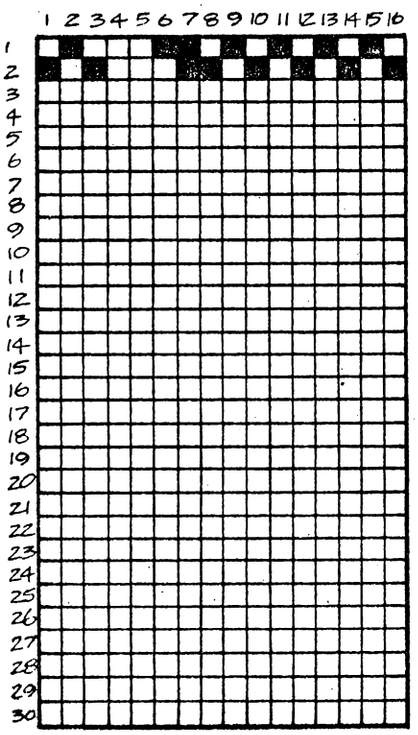
b. PEG PLAN



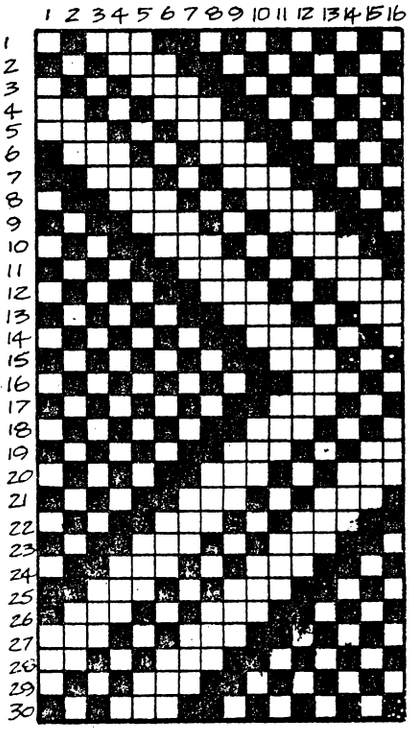
c. PEG PLAN



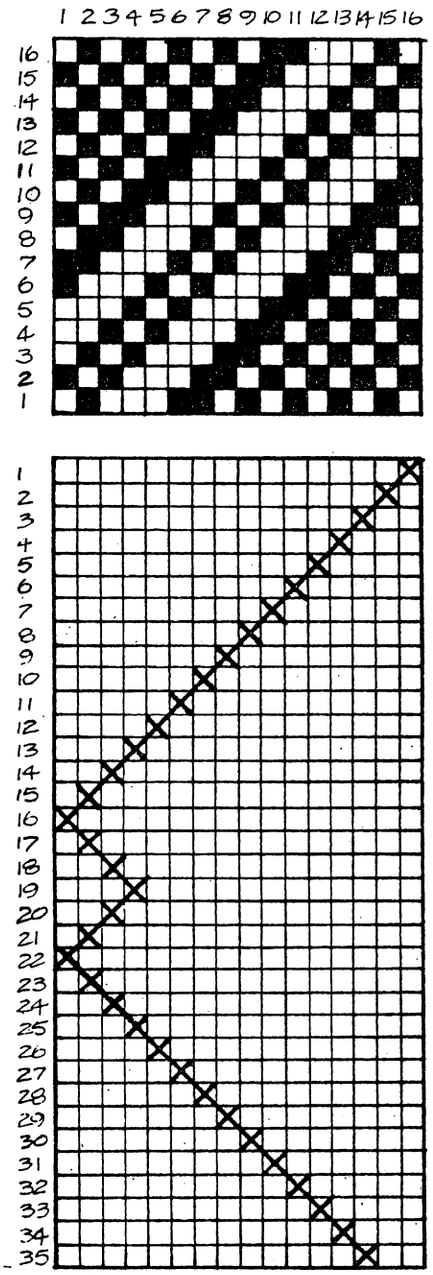
d. PEG PLAN



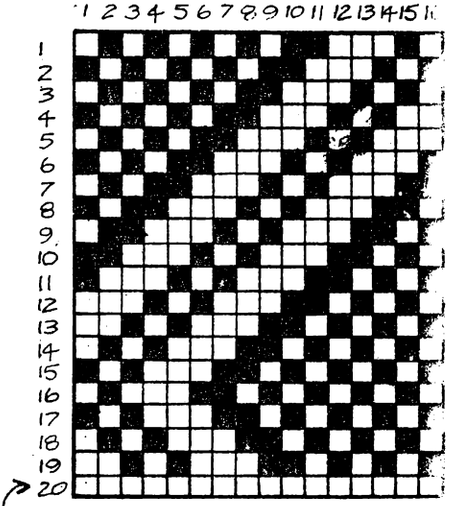
e. PEG PLAN



f. TIE-UP & TREADLING PLAN



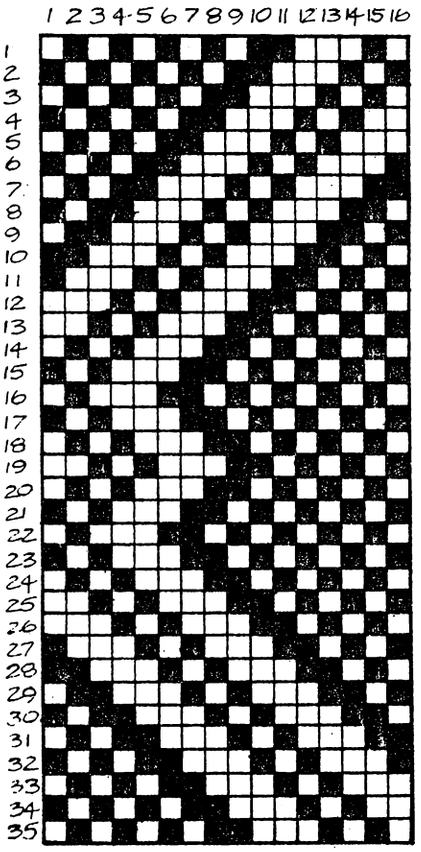
g. PEG PLAN USING REVERSING TECHNIQUE



BLANK BAR

IF THE DOBBY UNIT IS REVERSED AT THE BLANK BAR, THE PATTERN WILL BE WOVEN EXACTLY LIKE THE ONE REPRESENTED IN DIAGRAM f.

PEG PLAN



d. Next look at the second shed (2) of your treadling plan and note which harnesses will be raised. In diagram (a) that would be harnesses 1,3,7,8,10,12,14, and 16. Then proceed to the second horizontal row of your peg plan and fill in the squares corresponding to these harnesses as we have done in diagram (d).

e. Continue in this same manner until all the sheds of your treadling plan have been recorded on the peg plan as we have done in diagram (e). Diagram (f) on page 27 shows the same tie-up as in diagram (a) with a different treadling plan and its corresponding peg plan.

4. Here are some additional points to keep in mind when making up your peg plan:

a. At least <u>twenty dobby bars</u> must be used at once in order for the dobby unit to function properly, less than 20 bars will tend to jam in the dobby head. If the number of dobby bars or sheds in the treadling plan is fewer than twenty, they should be repeated several times. As an example, for a tabby weave which has only two sheds, repeat the pegging at least ten times, so that you will be using twenty bars. Fewer than 20 bars can be used if the chain of bars is weighted down to prevent jamming. The easiest way we have found to do this is to place a short length of 3/4" steel pipe, about 8" long, in the bottom loop of the dobby chain.

b. When the dobby chain is placed in the dobby unit it will form a continuous loop, so visualize your peg plan as circular. Check your peg plan to see that if the first shed follows the last shed the weaving pattern will turn out correctly. If

you make the mistake of making the first shed and the last shed the same, then when the chain is placed in the dobby unit two sheds exactly the same will follow each other.

c. There are times when you will find it helpful to use blank dobby bars to mark your place in your pattern. For instance, if you need to know where the beginning of a pattern is, leave a blank bar or two just before the dobby bar corresponding to the first shed of the pattern. When you are weaving and come to this blank bar, no harnesses will raise.

d. Keep in mind that the direction the chain moves can be reversed at any time. This feature can save pegging time and dobby chain. One example of its use is with a pattern where the second half is a mirror image of the first half. Only the first half of the pattern need be pegged, then by reversing the dobby unit the second half or mirror image is automatically produced. When using this technique be sure to leave a blank bar as a signal at the point at which the dobby is to be reversed. See diagram (g) on page 27 for an example of a peg plan using this technique. This feature can also be used where long lengths of tabby are to be woven between pattern borders. Simply peg-up part of the tabby and by repeatedly reversing, as much tabby can be woven as necessary. Here again use blank bars between the tabby part of the chain and the pattern part.

e. When using two shuttle weaves where there is a tabby shed in between each pattern shed, the tabby sheds are often not included on conventional treadle plans. Don't forget that on the peg plan for such a weave, a tabby shed must be filled in between every pattern shed.

f. Remember that with a dobby loom the number of combinations of raised harnesses is limited only by how many dobby bars you wish to use. On treadle type looms the number of combinations available is limited by how many treadles the loom has. As you gain more experience working with peg plans try designing right on the peg plan itself, adding raised harnesses wherever it suits the needs of your design.

5. Now peg your pattern up on dobby bars. The number of bars needed is determined by the number of rows in your peg plan. If you need to take off bars from the chain, unfasten the metal connecting loops with a long nosed plier. If you need to add bars to the chain use a long nosed plier to reconnect the metal loops; it is easiest however, to fasten them together with plastic tie tapes, jewelry hooks, or string. Again, if using string make sure it is strong and wrapped around twice with two knots.

   Before starting to put pegs in the bars, it is a good idea to mark the left end of the top bar with an X since it will be placed toward the from of the loom when placed in the dobby unit, otherwise it is easy to get the chain turned around backwards which would make your weaving pattern turn out all wrong. Keep this pegged up chain aside until it is time to place it in the dobby box.

6. When pegging up the dobby head, one thing that you should remember is that if over 100 to 150 bars are used, the weight of this chain of bars may cause the dobby head to skip a bar as it is advanced. If you are using a long length of dobby chain and you experience this skipping, you'll need to suspend an auxiliary roller (a rolling pin would work) so that it will support some of the weight of the bars.

7. Here are some tips for handling your dobby chains. First of all, keep one length of chain pegged with tabby weave in a handy location. THis way you can quickly do tabby weave whenever necessary without having

to repeg it each time. As you develop a repertoire of weaving patterns which you will be using over again, keep a notebook of their peg plans as well as other weaving information and give each weaving pattern a number. If you have lots of dobby chain, you can just leave the chain pegged-up ready to be used at any time; and each will be easy to identify if you write its number on a tag which is tied to the first dobby bar. If you do not have a lot of extra chain, here is a little trick that saves time if you are going to be repegging a pattern over again. Cut cardboard strips about the same length and width of the dobby bars. Make a guide by punching 16 holes in one strip, so that when that strip is held over a dobby bar the holes in the strip are aligned with the holes in the dobby bar. Use the guide to punch holes in the other strips corresponding to the way the dobby bars are pegged. Use them to quickly and easily repeg the dobby bars.

ADJUSTING THE BEATER AND SPRING LEVERS

1. In preparation for weaving, the Ahrens & Violette beater is adjusted in height as well as horizontal position. First place the beater in one of its three horizontal positions depending on your personal preference and/or how hard the fabric will be beaten. For a very heavy beat, the beater can be placed in its rearmost position. For a very light beat it can be placed in its front most position. Then adjust the height of the beater, by using the adjusting wing nut screws near the bottom of the beater legs, so that the bottom half of the shed is just touching the shuttle race in the open shed position. To open the shed on the dobby loom, press downward on the right treadle. When closing the shed on the dobby, make sure the left treadle goes all the way down.

2. The springs of the spring lever return system should be adjusted also so that there is positive harness return, i.e. the harnesses are staying all the way down in the depressed position, with the least amount of effort needed to raise the harness. This will vary according to the weight of the warp. In general, lightweight, less dense, looser tensioned warps with a smaller weaving width will need very little spring tension to assure positive harness return; whereas heavier, denser, tighter tensioned, and wider warps will need more spring tension. To tell if the harnesses are returning all the way, open several sheds by working the treadles. Watch the unlifted harnesses and if the tops of their heddles become loose and tend to move around, then spring tension should be increased, but just enough to get the harnesses to stay down and no more or your treadling effort will be made greater than it has to be.

3. To adjust the spring tension, simply unhook the spring and then rehook it one chain link shorter. This tightens the spring and makes it pull down harder on that particular harness. Test the warp again by doing

some more treadling and if more spring tension is still needed, try one or more chain links less. With a medium tight warp it may be necessary to remove the chain links and use only the spring. Under unusual conditions (perhaps a very tight rug warp) two springs on some or all of the harnesses may be necessary. If all the springs are set the same, the back harnesses will have a looser tension than the front. This is because the back spring levers and their hooks are longer since the back harnesses travel farther when a shed is made. Accordingly, in some cases the back spring levers might have to be adjusted shorter to give the same tension as the front ones. It may even be necessary to cut springs down if you need extra tension back there. The important thing to remember is that the system is designed so that it can be "fine tuned" for each particular warp, so experiment with it. In general, for most mediumly tensioned warps, you will find that a lot of adjusting will not be necessary. The loom comes with sixteen chains and sixteen springs. If extra springs are needed you can use 16" screen door springs which can be purchased in almost any hardware store; you can also get extra chain there.

WEAVING PROCEDURES

1. With everything properly adjusted, weaving is an easy and enjoyable process. Sit up straight and comfortably at the loom so that your body remains stationary while your arms and legs work the loom. On the modular loom simply press down on the treadles in the sequence determined by the pattern of your weaving. On the dobby loom start by pushing downward on the right treadle so that a shed is open and throw the shuttle. Pull the beater forward with a quick wrist movement, then close the shed and open a new one by first pressing downward on the left treadle then the right treadle again in rapid succession. The left treadle not only closes the shed, but advances the bars in the dobby unit. Even though it seems as if the left treadle goes down almost on its own, it is very important to press it all the way down with the left foot, otherwise the next dobby bar may not advance completely in the dobby box and this will cause errors.

2. To advance the cloth you simply wind it forward by using the ratchet handle while the beater is in its forward position. Make sure the fell of the cloth does not go beyond the front of the beater in order not to have to wind it backwards (see number 5 of SETTING THE TENSION DEVICE if this occurs). This easy, rapid method of advancing the cloth makes it practical to wind the cloth up about every two inches of weaving. By maintaining this two inch weaving space the swing of the beater and the shed angle are kept more nearly constant, and this makes it much easier to weave a uniform fabric.

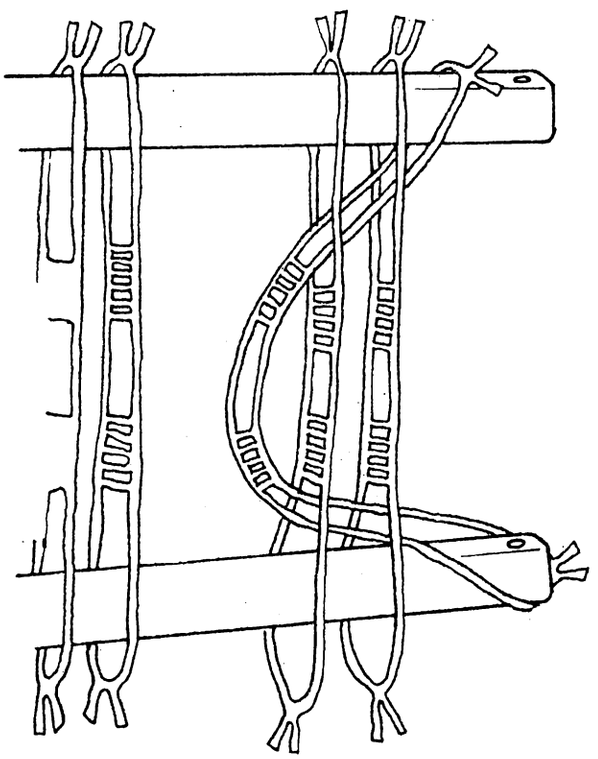
3. The position of the forward-reverse cord determines the direction in which the dobby chain will move. With the cord in its most extended position with the knot caught on the outside of the hole in the wooden stop bracket, the chain moves in a counterclockwise direction. To reverse the direction in which the chain moves, gently pull and snap the cord so that the knot goes through the hole and rests on the other

side of the stop. Be careful not to pull the cord too hard, or you will pull the spring out of shape.

4. In case of threading error, use the following method for insertion of a new heddle:

    a. Slip the top loop of the new heddle aroung the top harness stick and bring it through the top loops of all the heddles until it reaches the place needed.

    b. Take the bottom loop of the new heddle through the bottom loopl of all the heddles, around the bottom harness stick, and back through the bottom loops of all the heddles until it reaches its place.



INSERTION OF NEW HEDDLE

5. At the onset of weaving, first weave in 1" of a strong, medium weight, weft with a tabby weave. Check the tabby weave for errors. Any errors in the threading or sleying will show up here and it is and excellent time to make corrections. Then weave in two thin lease sticks on alternate sheds, followed by another 1/2" of tabby weave. Cloth strips are unnecessary, as the two woven-in lease sticks will even out the warp for you. Now change the dobby chain, or modular loom tie-up, if so desired, and proceed with your planned weaving until the woven-in lease sticks have wound around the roller about 1 1/4 times, in other words, until the woven cloth overlaps the lease sticks on the roller.

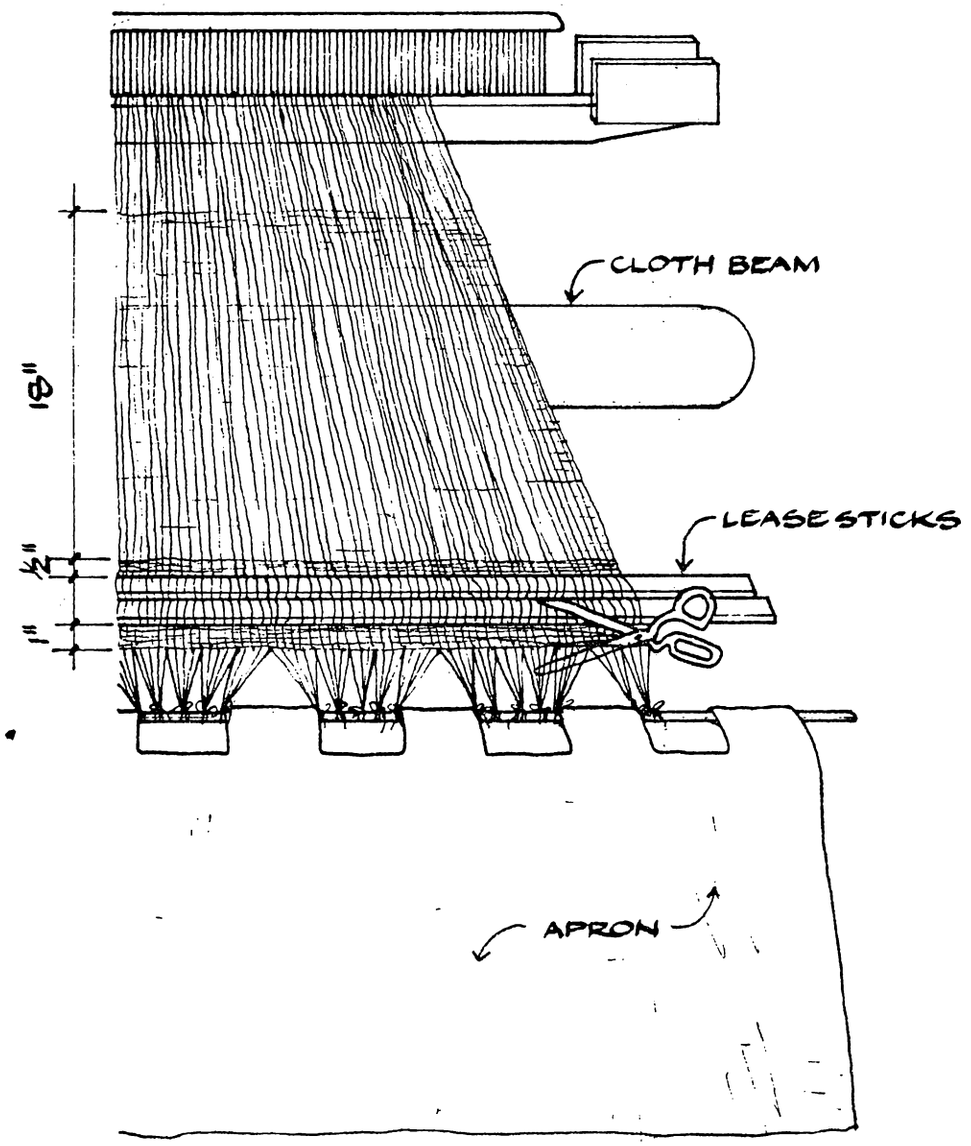
6. Now release the ratchet on the cloth beam and unwind the weaving back to the beginning. Unwind the weaving and apron from the front roll. Then remove the apron by cutting off the knots which tied the warp to the metal bar, but do NOT cut off the tabby hem or the woven-in lease sticks from the end of the warp (see diagram next page).

7. Place the two thin woven-in lease sticks flat on the front cloth beam making sure they are centered and parallel to the roller. Wind the weaving back on the cloth beam holding the lease sticks in place until the weaving is wound back over itself and holds itself in place.

8. Take up the tension by using the ratchet handle until the weighted tension lever rises to the horizontal position and continue weaving. Now that you have a smooth cloth roll in front, you will not have to be weaving over any knots or bumps and an even tension will be maintained in the weaving.

9. If you want to remove part of the weaving from the loom before the warp is woven off, use the following procedure:

    a. When the piece to be removed has been woven, weave one inch of tabby.



REMOVING THE APRON

b. Weave in two lease sticks followed by 1/2" of tabby as in 4 above.

c. Start new weaving.

d. Weave until the lease sticks are wound 1 1/4 times around the front cloth beam (or about 18" if weaving is being taken off the cloth storage).

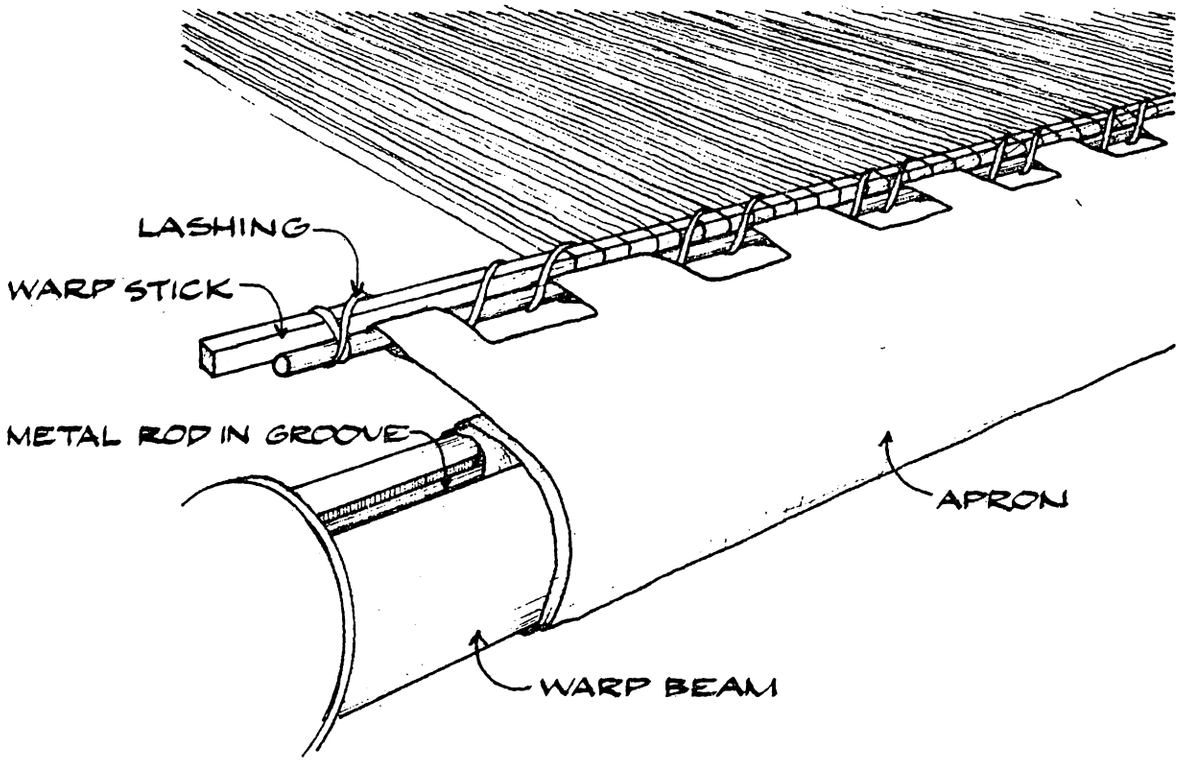
e. Unwind and cut off the piece to be removed just below the tabby hem and woven-in lease sticks as above.

f. Follow steps 6 and 7 above.

This method takes very little time, there is practically no waste, and a uniform warp tension is maintained.

10. Near the very end of the weaving the temporary apron will be used again to extend the end of the warp beyond the warp beam, thus decreasing yarn waste. You should already have binding cords around the warp beam so that the warp stick will be held in its groove just before it makes its last turn. Just when the warp stick is ready to fall out of the groove, remove bindings, wind the warp backwards a little to relieve tension and lift the stick with warp ends out of the groove. Take your apron which should already have a metal rod inserted in the hemmed end with the openings and insert a second metal rod in the plain hem at the opposite end. Place this second metal rod enclosed in the apron hem into the groove in the warp beam and wrap the apron around the beam, in the same direction as the warp is wound onto the beam, until the first metal rod is only a few inches away from the beam (see diagram next page). Take a strong cord and lash the wooden warp stick, with the warp ends on it, onto the metal rod in the end of the apron. Wind the warp forward from the front of the loom until the tension arm rises and continue weaving until the warp

end is just behind the harnesses.



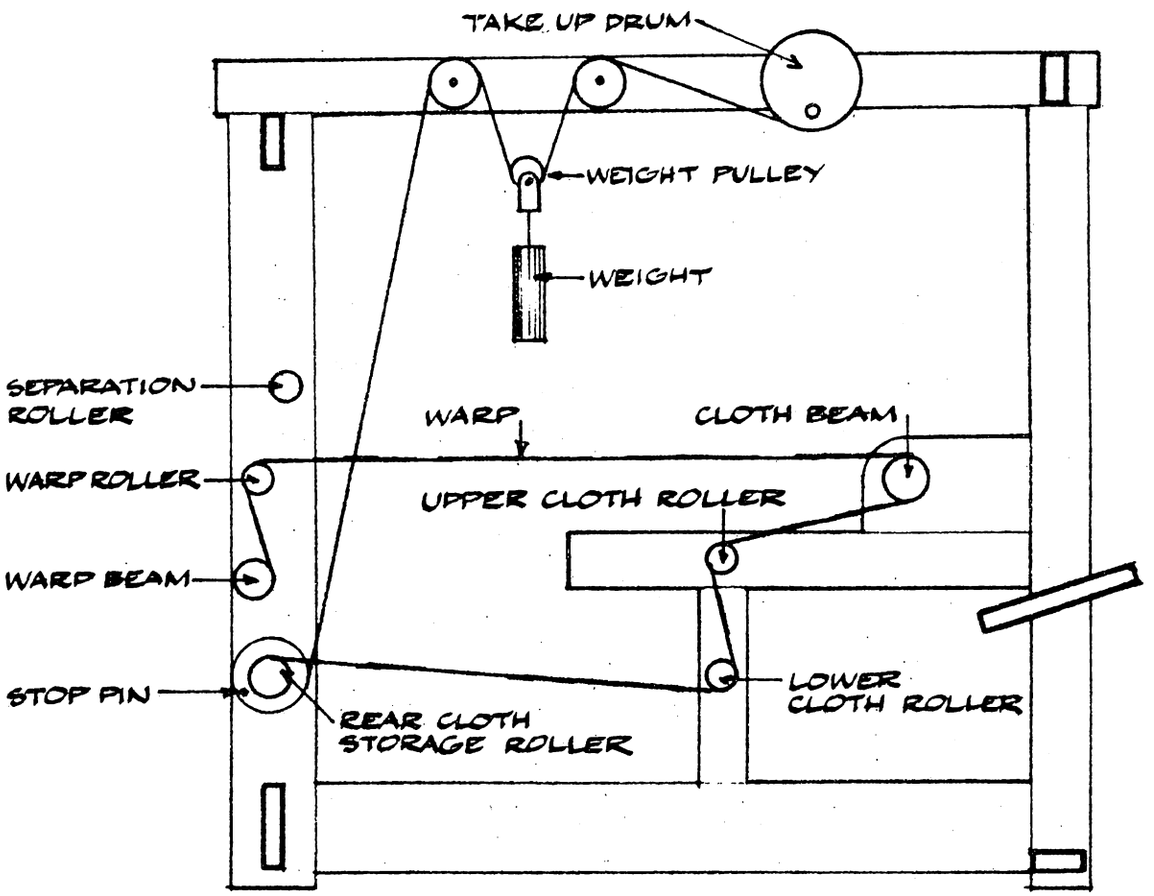
EXTENDING END OF WARP

USING THE CLOTH STORAGE ROLLER

When weaving long lengths of fabric, the material is taken around the front cloth beam and passes to the back of the loom to the cloth storage roller which can accomodate a roll up to 16" diameter. The cloth storage system, consisting of rope, pulleys, and a weight, is designed to automatically wind the woven cloth onto the storage roller. A looser tension is maintained on the storage roller than on the weaving. This eliminates any strain on the fabric, while the special abrasive surface of the cloth beam holds the proper tension on the weaving being done. This also makes it possible to weave long lengths of fabric that have an uneven surface which would ordinarily cause poor tension because of the uneven build-up on the front beam.

1. Allow the first three yards of weaving to roll up on the front cloth beam. Then release the front ratchet and unwind the fabric. Then route it over the upper cloth roller, under the lower cloth roller and over the top of the rear cloth storage roller as in the diagram on the following page.

2. The stop pin should be in its place in the rear cloth take-up drum and the cloth take-up weight should be in its topmost position. Remove the lease sticks from the end of the fabric so that the fabric will wind on nice and smooth. Then place the fabric on the roller, making sure it is centered and parallel; and fasten it on using 2" pieces of masking tape placed vertically at 6" intervals. You will next remove the stop pin and allow the fabric to turn onto the roller until tight. You'll need to use some caution here because as soon as the stop pin is removed the weight will start falling very fast and the roller will wind up very quickly if uncontrolled. To avoid this, hold your hands firmly around the roller and make the roller turn slowly inside your hands. When finished wind the weight back up to its topmost position by turning the take-up drum on the upper right hand side of the loom.



SECTION THRU LOOM SHOWING ROUTING TO REAR ROLLER

3. Now readjust the weaving tension by using the ratchet handle on the front cloth beam until the weighted tension lever rises, and continue weaving. As the weaving proceeds and the cloth is wound forward the weight on the pulley will gradually descend. Before the weight hits bottom, wind it back up to the top using the take-up drum. This will happen about every 1 1/2 to 2 yards.

4. If you are weaving a very thick fabric or rug which would build up quickly on the front roller you may want to connect the warp directly to the cloth storage roller without having to use the front beam for the first three yards. You will need a long apron for this purpose (these can be ordered from AVL Looms). With the weight at the top, and the stop pin in place, scotch tape the plain edge of the apron to the cloth storage roller. Then wind the apron once around itself so that it holds itself in place. Then simply route the apron around the lower cloth roller, the upper cloth roller and up over the cloth beam as in the diagram. If necessary, release the stop pin and gently wind the apron up until the metal apron bar is in the proper position for tying on to.

USING THE FLYSHUTTLE BEATER

The Ahrens & Violette flyshuttle beater is designed to increase weaving speed. It has such a light and easy action and such little physical exertion is needed to operate it, that weaving can be done for hours without causing fatigue to the weaver. With a properly wound bobbin and a little practice of the throwing technique, selvage edges turn out automatically smooth and even.

1. To change the reed on the flyshuttle beater first remove the beater top and then remove the seven bolts from the reed support. Then lift off the reed support and remove the reed. Now it's just a matter of reversing your steps for installing the new reed. This isn't as convenient as simply slipping the reed in and out of a groove as on a standard beater, but on a flyshuttle beater it is essential that the reed stays in perfect alignment with the shuttle race, or else you'll have flyshuttles flying across the room, thus the necessity of the reed support and the seven bolts.

2. A properly wound bobbin is essential to the whole flyshuttle operation working correctly. If the weft thread does not come smoothly off the bobbin, if the shuttle jerks and pulls the selvage edge too tightly, or if the shuttle fails to move lightly across the shuttle race, look to an improperly wound bobbin as the cause of your troubles. If a bobbin is not working properly, do not waste time fooling with it, place it aside and use another bobbin.

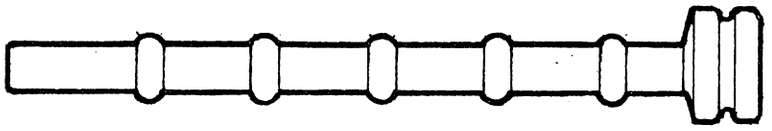
   The Ahrens & Violette shuttles use stationary, open end bobbins. The advantage of using this type of bobbin over the conventional spinning bobbin is that as soon as the shuttle is caught thread stops coming off the bobbin, whereas the spinning bobbin tends to keep spinning and

thus unwinding thread even after the shuttle is caught. The stationary bobbin allows the weaver to more easily get a clean selvedge edge. The Ahrens & Violette shuttle also has a built in adjustable tension device that puts the proper tension on the thread as it comes off the bobbin. This eliminates the need to lay in each weft shot and thus greatly speeds up the weaving process.

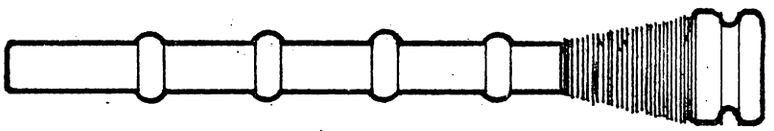
The stationary bobbins are wound quite differently than the spinning bobbins. They are <u>not</u> wound back and forth from one end of the bobbin to the other, so please practice the following technique until you get it right.

Use a standard size bobbin winder; a hand winder will work but and electric one would be better; and some sort of tensioning device would be ideal since the thread must be wound very tightly for best results. Make a few winds of the thread over itself at the far end of the bobbin (the end near the large part) and then place it on the winder. To start, build up a cone shape about 2" long at this far end. Consider this the first layer of thread. Then move down one fourth of an inch and start a new layer which will overlap one and three quarter inches of the last layer. For each layer wind the thread tightly and quickly back and forth covering a two inch area until that layer is complete. Keep repeating these tapered overlapping two inch layers until there is one half inch left at the end of the bobbin. You will learn to know when each layer is complete: if the layers are too fat the bobbin won't fit into the shuttle, but if they are too thin you won't get as much thread on the bobbin and it will have to be changed sooner. Wind many bobbins at once so it won't be necessary to stop and wind bobbins while weaving.

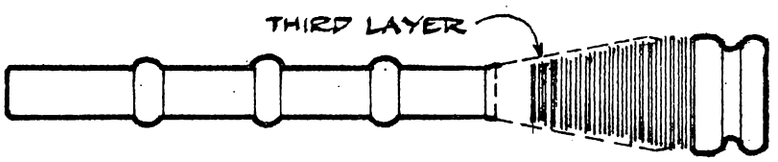
Now uncoil about six inches of thread off the bobbin and pass the end of this thread through the two middle plates of the tensioner at the end of the shuttle. Hold them open with your finger, then slip the thread through. Now pass the thread out through the hole in the



EMPTY BOBBIN



FIRST LAYER OF THREAD



SECOND LAYER

FULL BOBBIN

WINDING THE BOBBIN

ceramic bead, a small crochet hook makes this easy, and you are ready to insert the bobbin into the shuttle.

Pull up the metal rod in the middle of the shuttle and slip the large end of the bobbin onto it, it might be a little stiff at first, and then push the bobbin down into place so that the groove in the end of the bobbin straddles the retaining pin in the bottom of the shuttle. This prevents the bobbin from slipping off of the shaft. The shuttle is now ready to be woven with , but first take another look at the tensioner. You'll notice that on the outside of the shuttle are two allen headed adjusting screws, one on each side. By screwing in on these screws you increase the pressure of the springs on the middle tension plates and thus increase drag on the thread running between them.

So throw a few weft shots with the shuttle and then check your selvedges. If the selvedges are too loose, increase tension using the allen wrench provided; if tension is too great and the selvedges are drawing in, reduce tension. It may take a little experimenting to get it just the way you want it, but when properly adjusted they work beautifully.

A little trick that speeds up bobbin changing is to make the change before you have completely run out of thread. Simply unwind the last little bit off the bobbin and tie the end of it to the end of thread on the new bobbin. Then pull on the old thread to bring the new thread through the holes. This eliminates the necessity of having to rethread each time you change bobbins.

3. It's going to take a little practice to learn to throw the flyshuttle. Start out slowly and patiently. In the beginning you should only be concerned with learning the technique described below. Practice each step slowly and distinctly. This will form good habits which will become automatic, and it is after that that the speed will come.

You should practice at first with an empty bobbin; and then with weft thread when it starts to go a little smoother. Push the beater away from you to its rearmost position and place the shuttle on the shuttle race and slide it into one of the shuttle boxes so that it pushes the picker as far as it will go to the end of the box. The hole in the side of the shuttle through which the weft thread passes must be facing the weaver. Place one hand on the flyshuttle handle and the other hand in the center of the beater and open the shed. To send the shuttle along the shuttle race and into the opposite box with the single box fly beater, make a short quick wrist movement with the handle in the direction the shuttle is to travel; with the double box beater you pull straight down on the handle. Your body should be erect and relaxed and move only your hand and wrist. You will soon get a "feel" for the correct wrist movement. The shuttle should stop just at the end of the shuttle box without bouncing too far back or falling short. If the shuttle bounces too far back, too much weft thread will be let out of the shuttle and a loop will form at the selvage edge. If the shuttle falls short of its goal, it will not be in the correct position for throwing the next pick. If the shuttle falls short, push it to the end with your hand. Next move the beater forward to the fell of cloth using a wrist action with the hand that is on the beater. Again, keep the body relaxed and do <u>not</u> waste energy by moving your body backwards. Keeping the beater at the fell of the cloth, change sheds using the two treadles. This will keep each weft shot from "bouncing" back to its rearward position, and the sequence starts again; this time throwing the shuttle to the opposite side; but be sure <u>not</u> to change hand positions. To change shuttles on the double box beater simply lift up and shift to one side or the other the control handle on top of the beater.

Again, remember at first to practice each step distinctly and do not be in a hurry. As you get better at it the movements should become less distinct and start to flow into each other. The shuttle can be

thrown as the beater is moved forward, etc. Eventually it should all become one smooth flowing movement. The weaver's body stays straight and comfortable with no strain, as light movements of the hands, wrists, and feet are used to operate the loom. The weaver's eyes and attention are focused on the fabric being woven, constantly on the lookout for flaws, so that they can be corrected immediately.

When starting a new bobbin, there are two methods. One way is to throw the first shot by hand in the conventional manner holding on to the end of the thread, but instead of catching the shuttle send it all the way to the opposite box. The other way is to use the flyshuttle. Before sliding the shuttle into the box, take hold of the end of the thread with the hand that would ordinarily hold the beater. Keep on holding on to the end of the threads for this first shot.

4. If you are doing a weave that requires two or more shuttles to be thrown in succession, and you have a single box flyshuttle beater you will want to be hand throwing them as the single box flyshuttle beater doesn't lend itself to this type of weaving. It does work well however, with a two shuttle weave to use the flyshuttle for one shuttle, and throw the other one by hand -- try it! If you do much of this type of weaving you should probably consider the AVL double box flyshuttle beater. Anyway, if you are doing a weave that requires the hand throwing of shuttles, you can do this with the single box flyshuttle beater, simply by unclipping the cords and handle and removing the sliding pickers so that they don't get in your way; and then use the beater as you would a standard beater. If you are weaving a wide piece in this way you might experience difficulty in getting the shuttle through the shed without interfering with the box sides. If so, just remove the four screws from each front box side and remove them. This will give you plenty of room to work.

WARPING THE SECTIONAL BEAM

The Ahrens and Violette sectional beam is designed to be wound onto in seperate two inch sections with use of a tension box. The yarn travels directly from cones or spools which are mounted on a rack behind the loom, through the tension box and onto the beam. Throughout the warping process the tension box automatically keeps a constant and uniform tension on the warp. Not only does this system save time, but it makes it possible to wind on very long warps which would never fit on a warping board or reel.

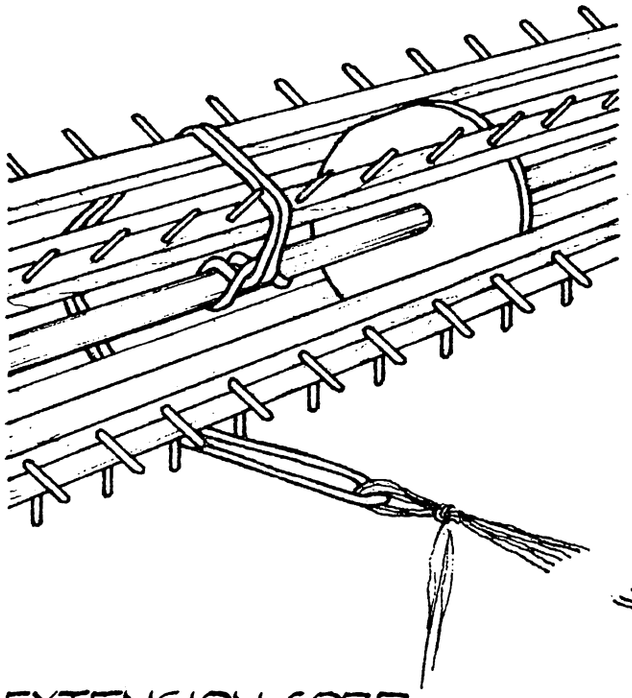
1. You must have enough spools or cones to be able to have one for each thread in each two inch section of your warp width. (With 16 EPI you will need 32 spools or cones, with 20 EPI you will need 40 spools or cones.) Figure out how many spools or cones you will need and how much yardage should be on each. This will vary according to the size of the spools, total yardage needed, repetition of color patterns in the section, etc. You may be able to work right off of spools or cones of yarn that you buy or you may need to wind your own from yarn that is in larger packages (you can purchase empty plastic spools from AVL Looms). You will also need a spool rack and/or cone rack to mount the spools or cones onto.

2. You must make a set of 24 extension cords to use when warping the sectional beam. Make them out of a strong non-stretchable linen or cotton. Cut 24 pieces of cord exactly 3 yards long. Then knot the two ends of each piece together (an overhand knot works well) so that a closed loop is formed measuring just under 1 1/2 yards. Make sure the knots on all the cords fall in exactly the same place so that all the extension cords are exactly the same size.

3. Place your spool or cone rack behind the loom about six feet away and place on it the spools or cones for the first two inch warp section. Make sure to line them up with the tension box which should be in back of the first two inch section at the left end of the sectional beam (side farthest away from the crank).

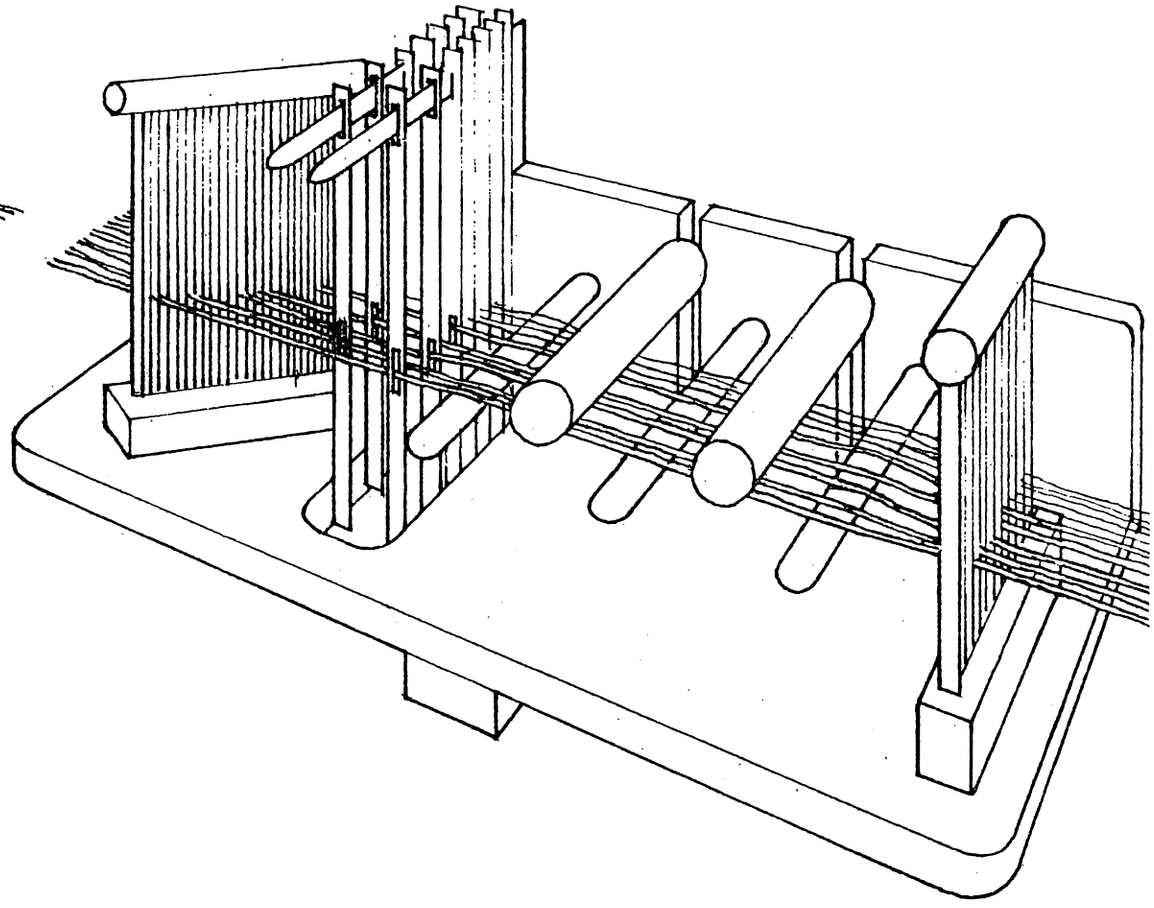
4. Next, thread the tension box. For descriptions' sake only, we shall go through the various parts of the tension box as if all the threads are threaded first through one part, then through the next part, etc. In actuality, however, it will work best if you take one thread from the rack and thread it all the way through all the parts of the tension box, then the next thread all the way through, etc. It also works well to use the threads from the rack in a vertical order rather than a horizontal order. In other words, start with a spool or cone at the bottom of the rack and work upward in a vertical column. When you have reached the top of the first column, start at the bottom of the next one, etc.

   So let's go through the sequence for threading the tension box. First move the two adjustable tension pegs up above the stationary pegs as shown in the diagram on the next page. Now sley the threads through the rear (stationary) reed section using a sley hook. Since this reed is 8 dents per inch, you will divide the EPI into 8 to find out how many ends will be in each dent (with 16 EPI, put 2 ends in a section). If you EPI does not divide equally by 8, you can either vary the number of ends in each dent (with 20 EPI, alternate 2 and 3 ends in the dents), or else you could thread the dents a little wider than two inches (with 20 EPI put 2 ends in each dent, with 40 ends the reed will be sleyed 2 1/2" wide). Next bring the threads straight through the tension peg section inbetween the larger adjustable tension pegs and the smaller stationary pegs as in the diagram. After the tension box is completely threaded, the larger



EXTENSION CORD

POSITION OF PEGS WITH
TENSION APPLIED



TENSION BOX

pegs are moved downward to apply tension. The farther down they are moved, the more tension will be applied to the yarn. This is an adjustable system, as different yarns require more or less tension. With a heavy wool the pegs may only need to be moved half way down; whereas, with a fine silk the pegs may need to be moved all the way down and the yarn wrapped an extra time around one of the stationary pegs to get the proper tension. Next, thread the ends through the two sets of heddles: the first thread goes through the front set of heddles and the next thread goes through the rear set of heddles. Repeat this alternating heddle threading for the rest of the ends; the heddle system will be used later to create the threading cross. Last, thread the ends through the front pivoting reed. Here you have a choice of using an 8 dent or 10 dent reed. Pick the one that can be sleyed evenly and as close to 2" wide as possible. Since there is not exactly a two inch space between the sectional beam pegs because the width of the pegs take up some of the space, and since it is important that the ends lie flat in the sections so that an uneven build-up does not occur, we have designed this special pivoting reed. Thread the reed as close to two inches wide as possible, this will make it just slightly wider than the space between the pegs. Then pivot the reed, by loosening the wing nut underneath, which will vary the width of the band of threads being fed onto the sectional beam so that the ends will just fit inbetween the pegs of the sectional beam.

Once the tension box has been threaded, it is not necessary to rethread it. If you need to change cones or spools, simply tie the new ends on to the old ends just before the rear stationary reed, then gently pull on the old ends until the new ends have come all the way through the box.

5. Attach one of the extension cords to the central pipe of the sectional beam in the first two inch section using a larks-head knot. Turn the sectional beam in a counterclockwise direction so that the extension cord is wrapped around the beam as in the diagram on page

51. Now tie the group of ends which you have just threaded through the tension box onto the end loop of the extension cord. Continue turning the sectional beam counterclockwise so that the ends are wound on from the bottom of the beam. Each rotation is approximately one yard, so count them till you have the desired yardage. For a more accurate count use a revolution counter (you can order these from AVL Looms). When there is about one turn left to go it is time to make the threading cross. Open the heddles so that the front set of threads is up and the bottom set down to get one side of the cross, and slip a marking tie in between the tension box and the loom. Then push the front set of heddles down and the back set upward to get the other side of the cross, slip the marking tie in again and secure with a knot. Wind the rest of the first section on, cut the ends, and secure with masking tape or a rubber band to the peg nearest to it which is away from the direction of the next section to be wound. Continue winding all the sections in the same manner by moving the tension box along its track, then undo the masking tape and slip a pair of lease sticks through the entire threading cross. Don't forget to bring the warp under the dividing rod before threading.

6. If you are winding a very fine warp, say 40 ends to the inch or more, and do not have, or do not want to wind a lot of spools or cones, it may be more convenient to wind separate two inch warp sections on a warping board or reel and go from there directly to the sectional beam. If you decide to do this however, your warp will be limited in length to what will fit on the warping board or reel. If you choose this method, first wind separate warps for each two inch section on a warping board or reel, marking the threading and raddle crosses and making choke ties on each. Chain each warp section off so that the raddle cross is available. For the next step you will need a movable reed section (available from AVL Looms) which will mount on the tension box track. Now thread the raddle cross groups in the reed sections. Then pivot the reed appropriately, and have one person

apply tension to the end of the warp as you turn the crank (use extension cords as above). When the threading cross reaches the moveable reed section, remove the warp from the reed and continue winding the rest of the warp section on. Secure the end of the warp to the beam with masking tape as above, and proceed to the next two inch section.

7. When setting the tension for the sectional beam, the tension arm weight and handle should be located on the outside of the tension arm as described in the assembly instructions. However, when the weight needs to be located out toward the end of the tension arm, then the weight and handle should be switched to the inside of the arm. This is necessary to give the arm sufficient operating clearance.

   In setting the tension, the adjusting cord should be set so that when the warp is advanced, the tension arm raises to about 45° above horizontal before it slips. Then as you continue weaving, the arm should fall back to a near horizontal position and remain there until the warp is advanced again. The thing you want to check here is that the arm is not riding down so low that the weight is resting on the sectional beam tension drum, thus preventing proper tension from being placed on the warp.

TROUBLE SHOOTING

The Problem	The Cause	The Remedy
Dobby skips	Pressing too hard or too quickly on treadles	Press treadles with a smooth, rhythmical motion
	Too many dobby bars in dobby head	Reduce number of bars or support bars with an auxiliary roller to take some of the weight off the dobby head
	Cable turnbuckle out of adjustment	Adjust according to assembly instructions
One or more harnesses that are supposed to raise, don't	Left treadle isn't being pressed all the way down.	Concentrate on getting both treadles all the way through their travel
	Dobby arm out of adjustment	Realign dobby arm according to assembly instructions
	Dobby cables out of finger slots	Rearrange cables according to assembly instructions
Harnesses don't raise properly	Harness cables have been hooked to wrong harness	Rearrange cables
	Chains from spring levers have been hooked to wrong harnesses	Rearrange chains
	Copper hooks on spring levers have been bent	Straighten hooks with pliers
	A harness cable has slipped off its pulley	Put cable back on pulley
	A treadle cable has slipped off its pulley	Put cable back on pulley
	Dobby arm rubbing on slot in dobby head	Realign dobby arm according to assembly instructions
Dobby head jams	Dobby chain not brought out over the top of the lower roller	Reverse dobby and turn by hand to get dobby chain out

The Problem	The Cause	The Remedy
Small or uneven shed	Dobby cable turnbuckle out of adjustment	Adjust turnbuckle according to assembly instructions
	Beater not adjusted properly	Adjust according to weaving instructions
Harneseses jam up on each other	Heddles not distributed evenly over harness sticks	Redistribute heddles evenly on both sides from the center of the harness sticks
Squeaking noise when harnesses are raised	Probably either in the dobby arm or treadle or harness pulleys	Isolate where the squeak is coming from, then either rub with paraffin or lubricate with WD-40, or a silicone spray
Excessive tension on warp	Too much weight on tension arm	Use a smaller weight on tension arm
	The tension rope has gotten crossed over itself on the warp beam brake drum	Straighten out rope
Flyshuttle hits the box sides	Reed not absolutely flush with shuttle race	Place small shims in back of reed so that it is perfectly even with the rear beater box side
	Picker too loose	Shim box sides so that picker just moves freely without too much play
Dobby arm binds, or rubs, in the slot in right side of dobby head	Extreme changes in weather can cause wood to expand	Check alignment of dobby arm or lightly sand slot in dobby head
Flyshuttle works hard	Change in weather can cause the sliding pickers to stick in their grooves	Place shims in back off front box sides so that pickers just slide freely. Don't over do this
Dobby head jams	Too short of a dobby chain	Increase chain length to 20 bars or so (double pattern)

The Problem	The Cause	The Remedy
Dobby chain does not advance	Detente wheel on dobby head loose	Contact AVL Looms Customer Service for advice on correcting this problem
Harnesses don't raise, or else they fall	Chain pegs not contacting the dobby fingers at proper angle (90 degrees)	Contact AVL
Can't get enough warp tension	Tension arm cord has stretched	Shorten cord by re-tieing the knot at the tension arm end

BOOKLIST

Here are some books containing information on multi-harness weaves and/or dobby looms. If you want to order any of them write to Ken Colwell, The Looms at the Brewery, Far End Shake Rag Street, Mineral Point, Wisconsin 53565 and ask about their availability and for a current price list.

Sixteen Harness Twills by Irene Wood about $5

Robin & Russ Handweaver, 533 N. Adams St. McMinnwille, OR 97128
Lots of 16 harness twills, some 12 harness twills, showing tie-ups and photos of samples, information for designing your own twills.

Weaving with Foot-Power Looms by Edward R. Worst about $4.50

Dover Publications, Inc., 180 Varisk St., N.Y., NY 10014
Some 10-12 harness twills, also one of few books with explanation of compound double weave.

Anstadt Designs by Ruth Holroyd about $40

Bond Press, Inc., Hartford, CT
Facsimile of original book, second volume moderises, beautifully done, many 16 and more harness twills plus many block designs.

Shuttlecraft Book of American Hand-Weaving by Atwater about $15

Macmillan
Older book with older weaves, mostly four harness, but has 4, 5, and 6 block twills, summer-and-winter, and double weaves.

Keep Me Warm One Night, by Burnham & Burnham about $30

University of Toronto Press

Beautiful book, mostly coverlets, explanation of various weaves, many examples, drafts given. Few point twills, overshot, summer-and-winter, double weaves, chapter on multiple shafts includes star and diamond and other things worth exploring.

Manual of Swedish Handweaving by Cyrus-Zetterstrom about $15

Chas. T. Branford Co., Newton Centre, MA 02159

Explanation of dobby, a few drafts, etc., good explanation of various weaves.d

Designing of the Loom by Mary Kirby about $6

Select Books, 5969 Wilbur Ave., Tarzana, CA 91356

Chapter of 16 harness looms, a few drafts specifically for dobby. Many things not seen elsewhere.

A Handbook of Weaves by Oelsner about $5

Dover Publications

All multiple shaft work. 1875 illustrations of drawdowns many appropriate for dobby. I think originally published in 1875 for the industry.

Weaving Techniques for The Multiple-Harness Loom by Pierre Ryall about $10

Van Nostrand Reinhold Co., 135 W. 50th St. N.Y., NY 10020

Original French, Like Oelsner with mostly drawdowns, no drafts as such.

More Than Four by Laughlin about $10

Nothing specifically for dobby but a variety of complex weaves explained.

Hand Weaving and Cloth Design by Marianne Straub about $15

Viking Press

Very concise information from dressing the loom through a wide variety of weaves. Chapter on the dobby.

Handloom Weaving Technology by Allen A. Fannin about $30

Available from Van Nostrand Reinhold Co., 135 W. 50th St., N.Y., NY 10020

The best book we've found that covers the operating principles of dobby looms.